2017 PREFACE

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

Different from the previous reports, the new revised Annual Report 2017 includes the following 12 parts listed in the connents. In order to avoid confusion in the meaning of Chinese names, all Chinese family names in this Report are capitalized.

We express our sincere gratitude to colleagues of related research departments and centers of the Institute for their support and efforts in compiling this Report and providing related material – a written record of the hard work of the Institute's scientific research personnel for the year 2017.

Editorial Board of
The Annual Report (English Version) of the Institute of Geology,
Chinese Academy of Geological Sciences
06 June 2018

Director
Academician Hou Zengqian

Deputy Director
HE Changhong

Deputy Director
Zhang Haiquan

Deputy Director
Wang Tao

Deputy Director
Wang Yucui

MESSAGE FROM THE DIRECTOR

Since its establishment in April 1956, the Institute of Geology has undergone more than 60 years course of trials and hardship. Adhering to the scientific spirits of "unity, dedication, factualism and innovation" all the time and being diligent and tireless, the Institute of Geology has received conspicuous achievements in many domains such as regional geology, structural geology, geological mapping, deposit geology, ultrahigh pressure metamorphism (UPH), deep crust probing, origin and evolution of life, and has cultivated a large number of outstanding geological talents. However, there are still many mysteries of the earth waiting for us to explore, we have a long way to go.

In the new era of socialism, the state is facing a serious challenge of a series of problems, such as resources, energy and environment. Geological science has become the key subject to solve the bottleneck problem of national energy resources and maintain the healthy and sustainable economic and social development. The goal of speeding up the construction of an innovative country in the new era has put forward a new and more high requirement to the innovation of geological science, which ushers in new challenges, provides a rare opportunity for the development of geology, and also creates a broader career stage for a large number of geoscience scientists to complete the historical mission. Closely centering on the establishment of an innovative research institute and aiming at supporting and leading the national public welfare geological survey and strategic mineral exploration, the Institute of Geology gives full play to the subject and technical advantages of research institution, enhances the multidisciplinary integration, combination of scientific research and geological survey, construction of innovation base and the cultivation of high-level talent, and improves the abilities of scientific innovation, technical support and social service of the Institute in all round, and makes great efforts to build a national-class and internationally renowned research center of earth sciences.

Forge ahead based on the present. The Institute of Geology will, through continuous progress and aggressive reformation, comprehensively promote the pilot reform of "giving more self-governing powers to colleges, universities and scientific research institutions, as well as empowering the leading innovative talents greater right to control personnel, property and material and the decision-making power on technical route", advance the establishment of national key laboratory platform, motivate the scientific and technical personnel, and create favorable institutional environment and cultural atmosphere to the technological innovation, offering more and more opportunities to outstanding persons, and the overseas talents are welcome to pursue innovation and entrepreneurship at the Institute of Geology, to reach new technological height and contribute themselves to the development of geological science.

With this opportunity, we, on behalf of the staff of the Institute of Geology, sincerely invite colleagues at home and abroad to join us, to reveal the mysterious earth sciences and greatly contribute to the economic construction and social development of China under cooperation, exploration and innovation.

The Institute of Geology, Chinese Academy of Geological Sciences (IGCAGS), is a national public scientific research institution and is mainly engaged in national fundamental, public, strategic and frontier geological survey and geoscientific research, aiming to provide fundamental geological theory and technological support for national geoscientific research and investigation:

(1) To carry out national fundamental, public, strategic and frontier geoscientific research and fundamental geological survey.

(2) To carry out investigation and innovation research on major basic geological problems in the field of earth resources and environment.

(3) To carry out fundamental disciplinary research on tectonic geology and geotectonics, regional geology and metallogeny, stratigraphy and palaeontology, metamorphic rocks and Precambrian geology, petrology and mineralogy, and Quaternary geology; to conduct research in major areas, such as continental tectonics and dynamics, deep lithosphere exploration and three-dimensional geological survey, isotope geology and chronology, comprehensive geological research and mapping research.

(4) To carry out research on isotopic chronology and geochemical techniques and systems, major key technologies and instruments and equipment; to undertake the construction, management and operation of relevant experimental and observational bases.

(5) To carry out basic geological international cooperation and exchanges.

The Institute has a total of 260 staff members, which includes 118 senior professionals, 5 A cademicians of the Chinese Academy of Sciences, 5 " New Century Talents Project" nominees, 1 "National Youth Talents Project" nominee, 4 "National Outstanding Contributions to Young Experts" nominees, 5 professionals supported by the "National Science Fund for Distinguished Young Scholar", and 1 research group supported by the "National Natural Science Foundation of China(NSFC) Science Fund for Creative Research Groups". In 2016, the Institute was supported by the Ministry of Science and Technology of China (MOST)'s "Innovative Talent Training Demonstration Project".

IGCAGS has trained a large number of excellent, highly qualified graduate students. It also has designated programs for postdoctoral research.The Institute has a post-graduate education system for Master's and PhD students. IGCAGS has 35 doctor tutors and 35 master tutors. The institute enrolls about 30 PhD and MA students each year, and currently has 38 postdoctoral researchers.

The Institute has 11 research divisions, namely Division of Regional Geology and Mapping, Division of Tectonics, Division of Stratigraphy and Paleontology, Division of Metamorphic Rocks and Precambrian Geology, Division of Igneous Rocks, Laboratory of Continental Dynamics, Laboratory of Isotope Geology, Lithosphere Research Center, Beijing SHRIMP Center, Mineral and Energy Resources Center, and Three-dimensional Geological Survey and Research Center. In addition, Beijing SHRIMP Center is National Fundamental Resources Platform of Science and Technology.

The Institute also has 4 key laboratories of the Ministry of the People`s Republic of Chian(MNR), namely the Key Laboratory of Continental Tectonics and Dynamics, the Key Laboratory of Isotope Geology, the Key Laboratory of Stratigraphy and Paleontology, Key Laboratory of Earthprobe and Geodynamics.

7 academic organizations are affiliated in the institute, namely China Commission of International Continental Scientific Drilling, Commission of Regional Geology and Mineralization of the Geological Society of China (GSC), Commission of Geological Mapping of GSC, Commission of Stratigraphy and Paleontology of GSC, Commission of Petrology of GSC, Commission of Isotope Geology(GSC), Commission of Metamorphism, Mineralogy and Geochemistry of GSC.

In recent years, the Institute has undertaken more than 500 research projects. Including the "National Science and Technology Major Project of MOST", National Scientific Instruments and Equipment, the National Key Research and Development Plan (including the "National Basic Research Program of China (973 Program)", significant research programs supported by the National Natural Science Foundation, as well as projects of China Geological Survry(CGS), and so on.

The Institute has produced a great number of innovative results by promoting the growth of talents, fostering innovative ideas, and enhancing the ability to perform scientific research and meet major national needs, and has achieved a large number of innovative achievements in the field of solid Earth science. The Institute attaches great importance to intellectual property rights, having been authorized for about 16 patents. In recent years, 5 research achievements have been awarded to the Institute, including 1 National Natural Science Awards, and 4 Science and Technology Progress Award from MNR.

Editorial Board of
The Annual Report (English Version) of the Institute of Geology,
Chinese Academy of Geological Sciences
06 June 2018

Organizational Framework

*Administrative Departments

General Office

Party Committee Office

Service and Security Department

Finance Department

Department of Personnel and Education

Department of Science and Technology

Department of Experimental Administration

Department of Discipline Inspection and Supervision

*Professional Research Divisions

Division of Regional Geology and Mapping

Division of Tectonics

Division of Stratigraphy and Paleontology

Division of Metamorphic Rocks and Precambrian Geology

Division of Igneous Rocks

Laboratory of Continental Dynamics

Laboratory of Isotope Geology

Lithosphere Research Center (LRC)

Beijing SHRIMP Center

Mineral and Energy Resources Center

Three-dimensional Geological Survey and Research Center

* Technical Support Organizations

National Geological Mapping and Research Center, China Geological Survey

Collaborative Research Center for Stratigraphy and Paleontology, China Geological Survey

Three-dimensional Geological Survey Center, China Geological Survey

* Technology Platform

Beijing SHRIMP Center of the National Science and Technology Resource Sharing Service Platform

Key Laboratory of Deep Geodynamics, Ministry of Natural Resources

Key Laboratory of Isotope Geology, Ministry of Natural Resources

Key Laboratory of Stratigraphy and Paleontology, Ministry of Natural Resources

Key Laboratory of Deep Exploration and Geodynamics, Ministry of Natural Resources

* Affiliated Academic Organizations

China Commission for International Continental Scientific Drilling

Commission for Regional Geology and Mineralization, Geological Society of China

* Publications

Acta Petrologica et Mineralogica

* Research Fields

▲Regional geology, mapping and database construction

▲Regional and global tectonics

▲Origin and evolution of life, paleontology and stratigraphy

▲Sedimentary basins and evolution of paleogeography and paleoenvironments

▲Precambrian geology and early crustal evolution

▲Cenozoic geology and modern geological and ecological environments

▲Ultrahigh pressure metamorphism and metamorphic belts

▲Petrology, mineralogy and mineral deposits

▲Continental dynamics and mantle dynamics

▲Geological setting of mineralization and regional mineralization

▲Three-dimensional geological surveying

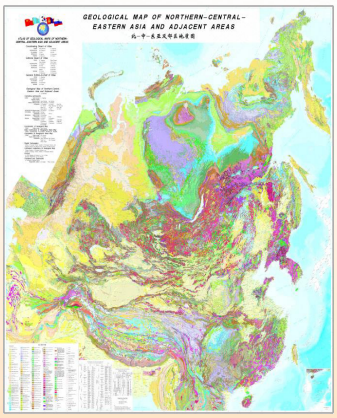
▲Deep geophysical probing and lithospheric structures

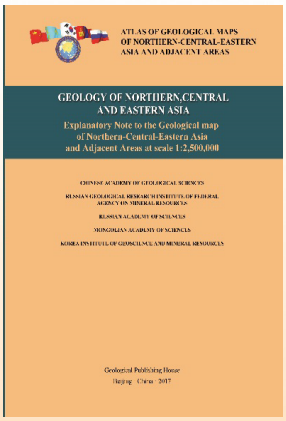
▲Geological theory, method system and applications of Isotopes

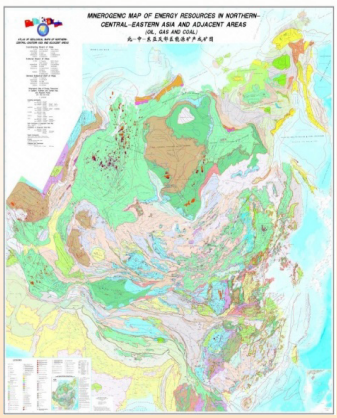
5.1 Regional Geology and Mapping

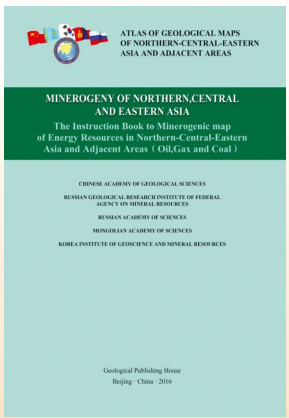
books of regional geology of ten provinces have been publicated, including Jiangxi, Fujian, Hainan, Hunan, Guizhou, Shaanxi, Ningxia, Hebei, Liaoning and Tianjin, and the series maps thereof, including geological, structural, magmatic rock, Quaternary geological and geomorphologic, aeromagnetic anomaly and gravitational anomaly maps

Completion of 1: 2500000 Geological Map of North, Central and East Asia and Adjacent Areas and 1: 2500000 Metallogenic Map of Energy Resources in East, North and Central Asia and Adjacent Areas and their figures and instructions



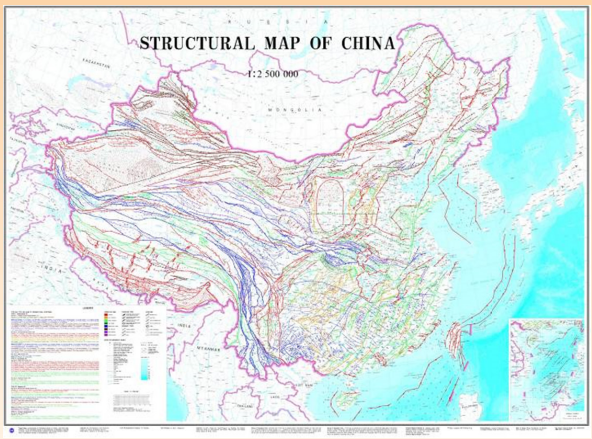


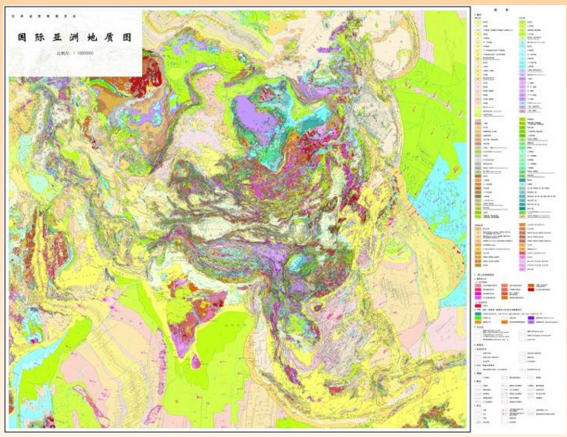




5.2 Structural mapping

Modification and publication of the English maps and instructions of Large-scale Deformation Map of China, and the finalized figures of 1: 10000000 International Geological Map of Asia

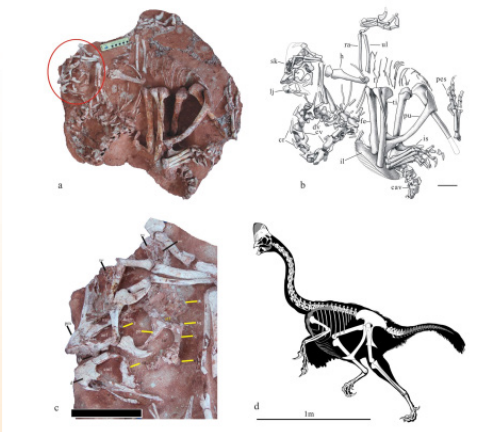


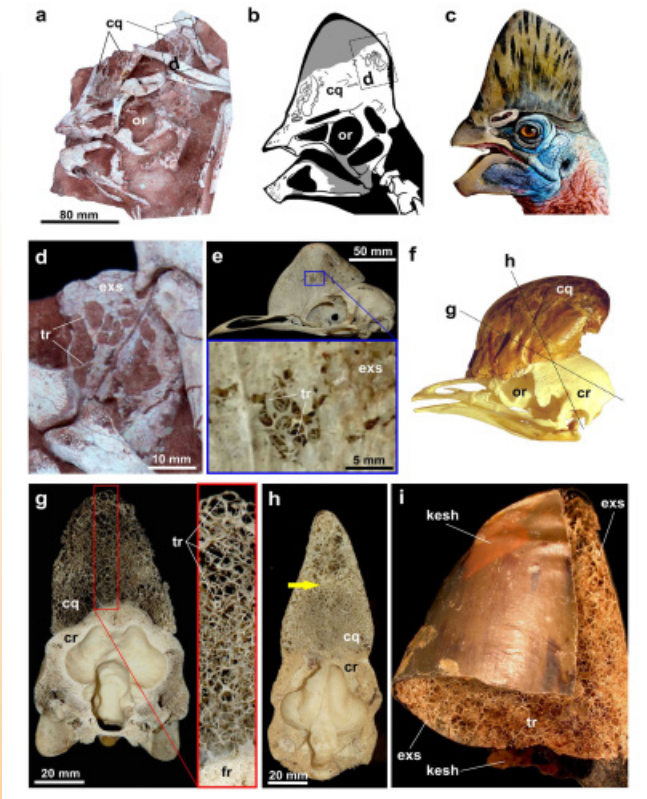


5.3 Research Papers

High diversity of the Ganzhou Oviraptorid Fauna increased by a new "cassowary-like" crested species

ABSTRACT: A new oviraptorid dinosaur from the Late Cretaceous of Ganzhou, bringing oviraptrotid diversity of this region to seven taxa, is described. It is characterized by a distinct cassowary-like crest on the skull, no



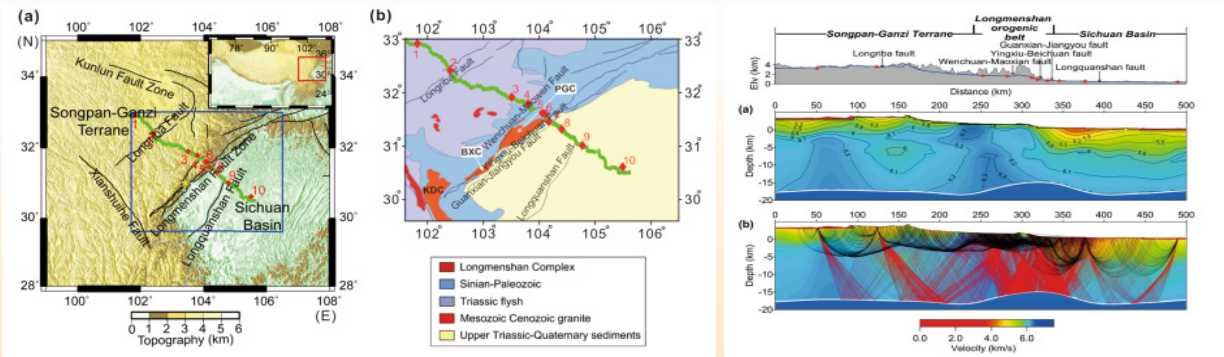


Lü JC et al., 2017– Scientific Reports 2017, 7(1): 6393

pleurocoels on the centra from the second through fourth cervical vertebrae, a neck twice as long as the dorsal vertebral column and slightly longer than the forelimb (including the manus). Phylogenetic analysis recovers the new oviraptorid taxon, Corythoraptor jacobsi, as closely related to Huanansaurus from Ganzhou. Osteochronology suggests that the type specimen of Corythoraptor had not reached stationary growth stage but died while decreasing growth rates. The histology implies that it would correspond to an immature individual approximately eight years old. We hypothesize, based on the inner structure compared to that in modern cassowaries, that the prominent casque of Corythoraptor was a multifunction-structure utilized in display, communication and probably expression of the fitness during mating seasons.

Vertical crustal motions across Eastern Tibet revealed by topography-dependent seismic tomography

ABSTRACT: Using a topography-dependent tomographic scheme, the seismic velocity structure of the Eastern Tibetan Plateau, including the uplifted Longmenshan (LMS) orogenic belt, is accurately imaged in spite of the extreme topographic relief in the LMS region and thick sedimentary covers in the neighbouring Sichuan Basin. The obtained image shows a high-resolution upper crustal structure on a 500 km-long profile that is perpendicular to the LMS. The image clearly shows that the crystalline basement was uplifted within the LMS orogenic belt, and that the neighbouring Songpan-Ganzi Terrane was covered by a thick flysch belt, with evidence of near-surface thrust faults caused by convergence between Eastern Tibet and the Sichuan Basin. The indication that the lower crust beneath the LMS was folded and pushed upwards and the upper crust was removed by exhumation, supports the concept of a lower crustal channel flow beneath Eastern Tibet. The image also reveals that the destructive Wenchuan earthquake of year 2008 occurred in the upper crust, directly at the structural discontinuity between Eastern Tibet Plateau and the Sichuan Basin.

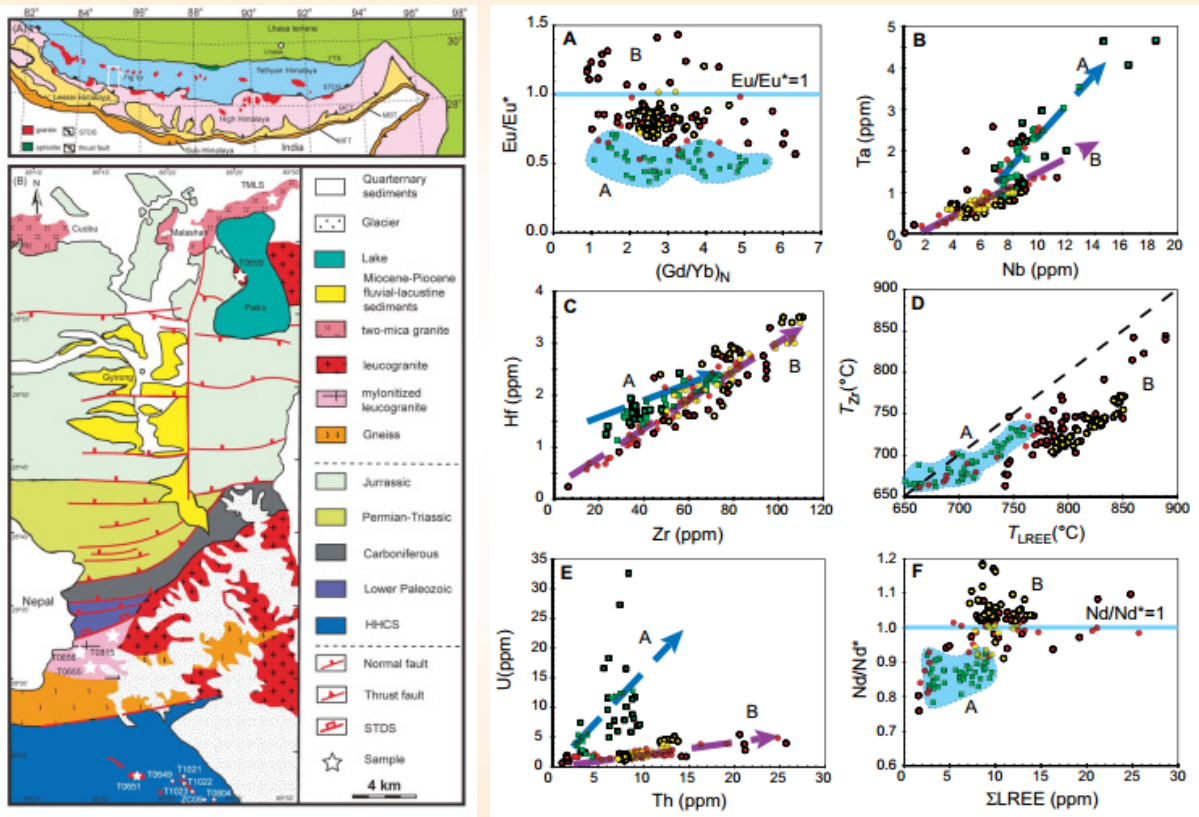


Zhang XY et al., 2017– Scientific Reports 2017, 7(1): 3243

Contrasting geochemical signatures of fluid-absent versus fluid fluxed melting of muscovite in metasedimentary sources: The Himalayan leucogranites

ABSTRACT: Most of the Himalayan Cenozoic leucogranites are products of partial melting of metapelite sources. In the Malashan-Gyirong area (southern Tibet), the geochemical compositions of leucogranites define two groups with distinct whole-rock major elements, large ion lithophile elements, rare earth elements, high field strength elements,

and Sr and Hf isotope ratios. Based on published experimental results that define generalized melting reactions of metapelitic sources, we infer that these leucogranites are the products of two different types of crustal anatexis: fluid-fluxed melting and fluid-absent melting of muscovite in metasedimentary sources. As compared to the leucogranites derived from fluid-absent melting, those from fluid-fluxed melting have relatively higher Ca, Sr, Ba, Zr, Hf, Th, and light rare earth element concentrations, and Zr/Hf, Eu/Eu*, and Nd/Nd*, but lower Rb, Nb, Ta, and U concentrations, Rb/Sr and 87Sr/86Sr ratios, and ε Hf(t). The geochemical differences can be explained by melting behaviors of major (muscovite, feldspar) and accessory minerals (zircon and monazite) during different modes of crustal anatexis. The systematic elemental and isotopic signatures of different types of crustal anatexis and, in particular, the coupling of major and trace elements that results from common influences on rock-forming and accessory mineral behaviors provide tools with which to refine our understanding of the nature of crustal anatexis.

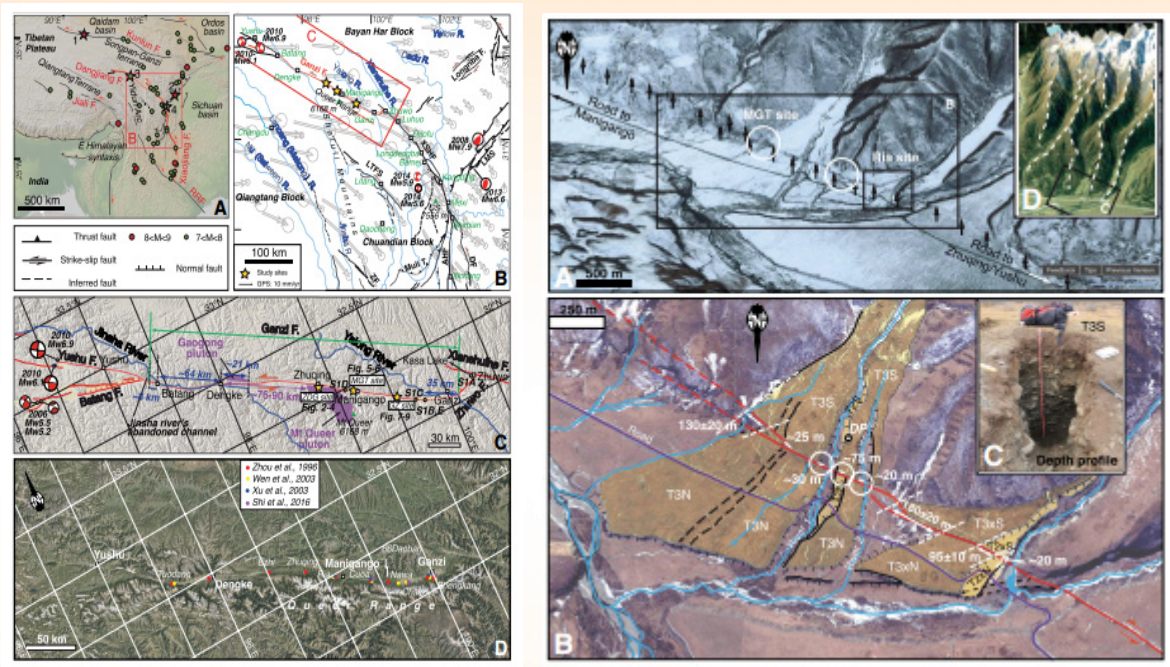


Gao LE et al., 2017– Geology 2017, 45(1): 39–42

Temporally constant slip rate along the Ganzi fault, NW Xianshuihe fault system, eastern Tibet

ABSTRACT: The left-lateral strike-slip Xianshuihe fault system, located in eastern Tibet, is one of the most tectonically active intracontinental fault systems in China, if not in the world, along which more than 20 M >6.5 earthquakes have occurred since A.D. 1700, including the 2010 Mw 6.9 Yushu earthquake. It is therefore essential to precisely determine its slip rate, which remains poorly constrained at all time scales, in order to evaluate regional earthquake hazard. Here, we focus on the NW segment of the Xianshuihe fault system, the Ganzi fault. We studied

three sites where the active Ganzi fault cuts and left-laterally offsets moraine crests and fan edges. We constrained left-lateral offsets using light detection and ranging (LiDAR) and kinematic global positioning system (GPS) methods, and we used cosmogenic dating to determine the abandonment age of the offset surfaces. We found that the slip rate remains constant along the entire Ganzi fault (~300 km) at 6–8 mm/yr at the late Quaternary time scale, consistent with geodetic (interferometric synthetic aperture radar [InSAR] and GPS) as well as geologic slip rates (4.9–7.5 mm/ yr since ca. 12.6 Ma). This implies that the Manigango segment of the Ganzi fault could potentially produce a M 7.6 earthquake in the near future. While the Xianshuihe fault system propagated from west to east, the fact that the Ganzi fault's long-term slip rate is similar to that of the Xianshuihe fault to the SE suggests that the onset of the Xianshuihe fault system at ca. 13 Ma marked a major transition in tectonic regime in SE Tibet.

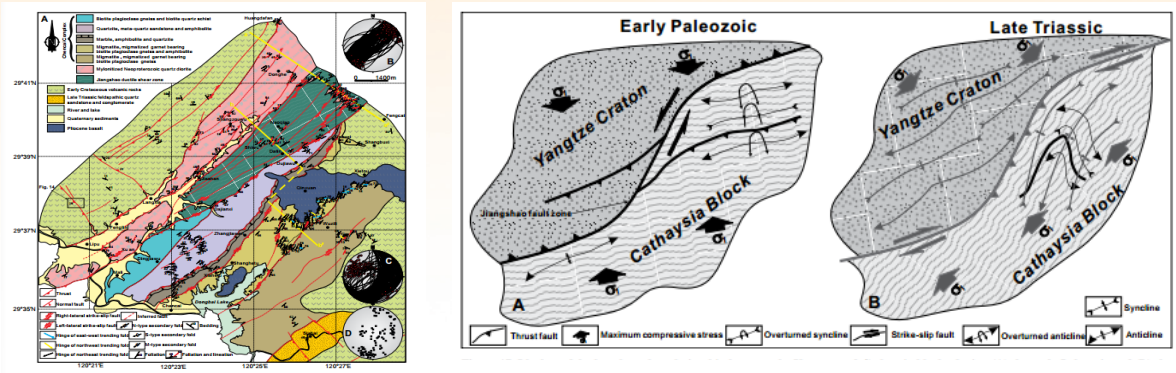


Marie-Luce Chevalie et al., 2017– GSA bulletin Doi: 10.1130/B31691.1

Paleozoic to Mesozoic deformation of eastern Cathaysia: A case study of the Chencai complex, Zhejiang Province, eastern China, and its tectonic implications

ABSTRACT: The early Paleozoic orogeny in South China created an important orogenic belt in East Asia, which possibly extends southwest to the Indochina block and northeast to the Korean Peninsula. Although this orogeny is interpreted as one of the examples of intraplate orogenesis in the world, the driver for the orogeny and its deformation details are poorly understood. In this study, we provide detailed structural analysis of the basement of the northeastern Cathaysia block (i.e., Chencai complex) with geochronological constraints. We combine previous studies with ours and obtain the following results. (1) The Chencai complex has experienced multiple metamorphic and deformation events since the early Paleozoic. The earliest deformation was northward thrusting at ca. 460–420 Ma (Dn+1a), which resulted in the thickening of the crust and coeval regional metamorphism (high-grade amphibolite to granulite facies). During the late stages of the orogeny (ca. 420–390 Ma, Dn+1b), the crust was extended and thinned; metamorphism and deformation during this stage erased the information from earlier stage(s). This early deformation

(Dn+1) may have resulted from an intraplate orogeny and may have been a response to the Kuungan orogeny or Bhimphedian orogeny to the south, which caused the final assembly of Gondwana. The Jiangshan-Shaoxing fault belt was a sinistral ductile shear zone that formed to accommodate deformation between the Yangtze block and the eastern Cathaysia block. The Cathaysia block moved northward during the early Paleozoic and compressed the eastern Yangtze block. (2) During the Triassic, the Chencai complex experienced folding, forming northeast-southwest–trending close isoclinal folds as part of the regional thrust system along the southeastern margin of the Yangtze block at this time (Dn+2). (3) A group of northeast-southwest–trending thrusts cut the Chencai complex and placed it directly onto the Jiangshan-Shaoxing fault belt during the Late Jurassic (Dn+3). The main structures in the studied outcrops of the Chencai complex formed during the Triassic and Jurassic, not the early Paleozoic. (4) The fourth deformation event of the Chencai complex was a series of northwest-southeast-trending open folds that may have developed during the Cenozoic.

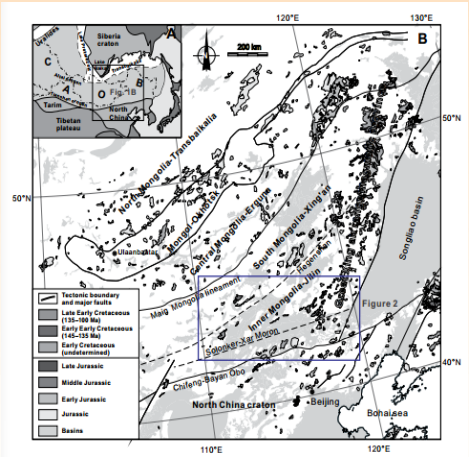


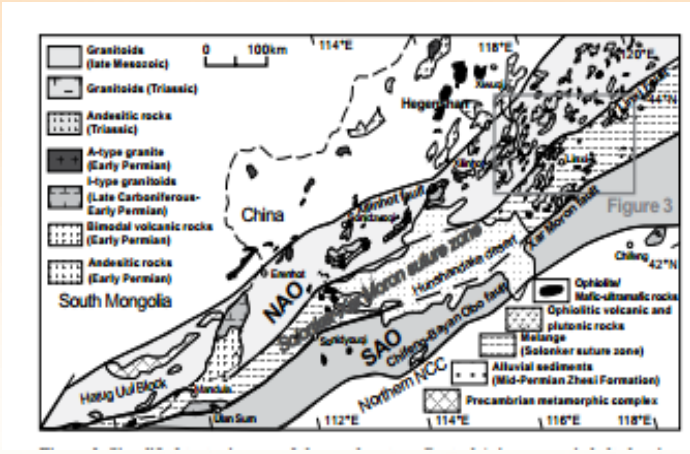
Zhang J et al., 2017– GSA Bulletin DOI: 10.1130/B31680.1

Water-fluxed crustal melting and petrogenesis of large-scale Early Cretaceous intracontinental granitoids in the southern Great Xing'an Range, North China

ABSTRACT: We present a new petrogenetic model to explain the late Mesozoic large-scale magmatism in the southern Great Xing'an Range, North China. Why did voluminous magmatic activity over a wide region of Northeast China occur so dramatically in the Early Cretaceous? Here, we present new whole rock geochemical and Sr-Nd-Li isotopic data from a suite of dioritic-granitic rocks and insights into the petrogenesis and geodynamics of the large-scale Early Cretaceous granitoid magmatism in the southern Great Xing'an Range. These samples are enriched in large ion lithophile elements (LILEs) and light rare earth elements (LREEs) but depleted in Nb, Ta, and Ti for both the diorites and granitic suite, showing typical features of subduction-related magmas. The slightly low Nd values (εNd[t] = ~–0.5) and low 87Sr/86Sri values (~0.7056) of the diorites along with significant LILE and LREE enrichment indicate they probably evolved from mafic magmas metasomatized by slab melts or fluids. The variable Sri values (0.7050–0.7083) and negative to weakly positive εNd(t) values (–6.2 to +1.4) of the granitic suite suggest a dominantly old crustal source with involvement of mantle-derived materials in their generation. The granitic suite has variable δ7Li values (+1.2‰ to +12.2‰), indicating their source had experienced heterogeneous hydration in response to deep fluid propagation. These Early Cretaceous granitoids have low Zr contents (<300 ppm) and low zircon saturation temperatures (TZr < 800 °C), which are significantly lower than those expected for dehydration melting of mostly crust (TZr > 800 °C), indicating their source was likely associated with the fluid from deep

subducted slabs within the hydrous mantle transition zone. Fluid from hydrated stagnant slabs could catalyze and initiate waterfluxed crustal melting to produce hydrous granitic melts at 800–600 °C and 5–10 kbar, with 2–5 wt% H2O contents. Although we could not specify the true extent of stagnant paleo-Pacifc slabs, the genesis of large-scale Early Cretaceous granitoids is essentially a snapshot of water-fluxed crustal melting in the southern Great Xing'an Range. Such melting could have played an important role in the Mesozoic deep crust architecture of Northeast Asia.

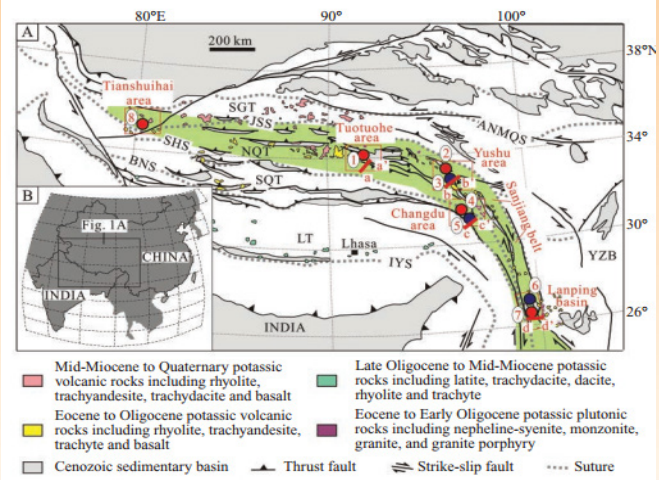


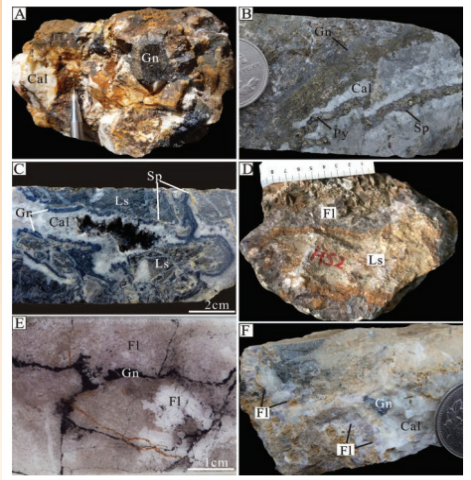


Li S et al., 2017– GSA Bulletin DOI: 10.1130/B31771.1

Hydrothermal fluid origins of carbonate-hosted Pb-Zn deposits of the Sanjiang thrust belt, Tibet: Indications from noble gases and halogens

Conclusions: The Sanjiang belt Pb-Zn deposits are hosted by thrust faults in an active tectonic setting and represent an important variant of carbonate-hosted Pb-Zn mineralization that is significantly different to classic MVT mineralization. The deposits have been subdivided into carbonate-rich and carbonate-fluorite varieties. Combined halogen (Cl, Br, and I) and noble gas (He, Ar, Kr, and Xe) analyses of fluid inclusions trapped in ore-stage calcite and fluorite within these deposits indicate that the ore-forming fluids were dominated by basinal brine sedimentary formation waters. Mineralization occurred as a result of mixing two brines transported through independent aquifers and localized by the intersection of thrust fault and strike-slip faults. The brines acquired their salinity by subaerial evaporation; the shallowest low-temperature brine (~50°–70°C) was modified by addition of organic gases, H_2S, and organic Br and I derived from the gypsum-bearing and bituminous- and coal-bearing sedimentary units; whereas brines transported more deeply into the Sanjiang belt thrust system and possibly transported along the decollement horizon acquired much higher temperatures and derived metals from regional sediments and 3He and F by mixing with a minor magmato-metamorphic fluid related to emplacement of Cenozoic age potassic intrusions. Mixing of the brines was triggered when the regional stress field changed from compression to extension. Carbonate-fluorite deposits formed in the deepest parts of the thrust system and carbonate-rich deposits formed higher in the system after the deeply sourced fluid had become depleted in fluorine.

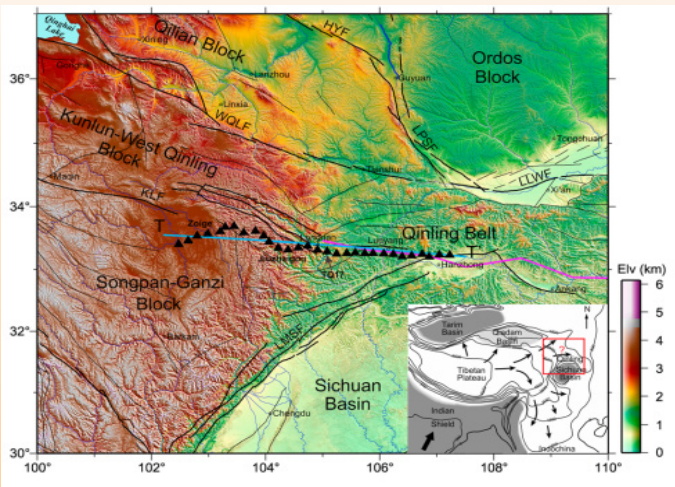


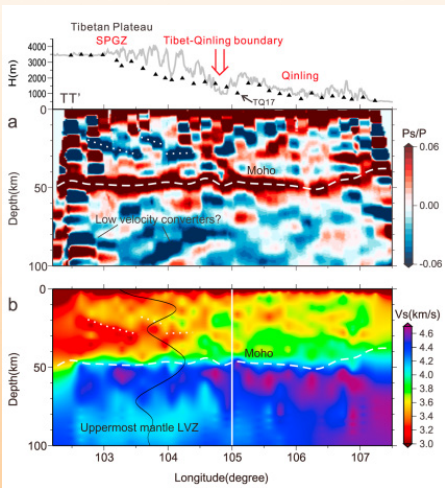


Liu YC et al., 2017–Economic Geology 2017, 112: 1247-1268

Crustal and uppermost mantle structure across the Tibet-Qinling transition zone in NE Tibet: Implications for material extrusion beneath the Tibetan plateau

ABSTRACT: Based on a dense linear seismic array traversing the eastern margin of the Tibetan Plateau into the Qinling Belt, we conducted a joint inversion of receiver functions and surface wave dispersion curves under P wave velocity constraints and simultaneously derived a crustal and uppermost mantle Vs profile with a Vp/Vs profile. Our observations indicate that the Qinling Belt, of which the lower crust exhibits Vp/Vs values less than 1.8 that are indicative of an intermediate to felsic composition, is currently not serving as a channel accommodating the extrusion of middle to lower crustal materials of the Tibetan Plateau. Channelized ductile mantle flow from beneath the Tibetan Plateau through the Qinling Belt would be feasible only at sublithospheric depths (i.e., in the asthenosphere). Our results suggest that the extrusion of ductile middle to lower crustal materials accompanied by fault-related tectonics and isostatic buoyancy resulting from lithospheric detachment (triggered by asthenospheric flow) may have jointly engendered the plateau uplift and expansion in the Tibet-Qinling transition zone.

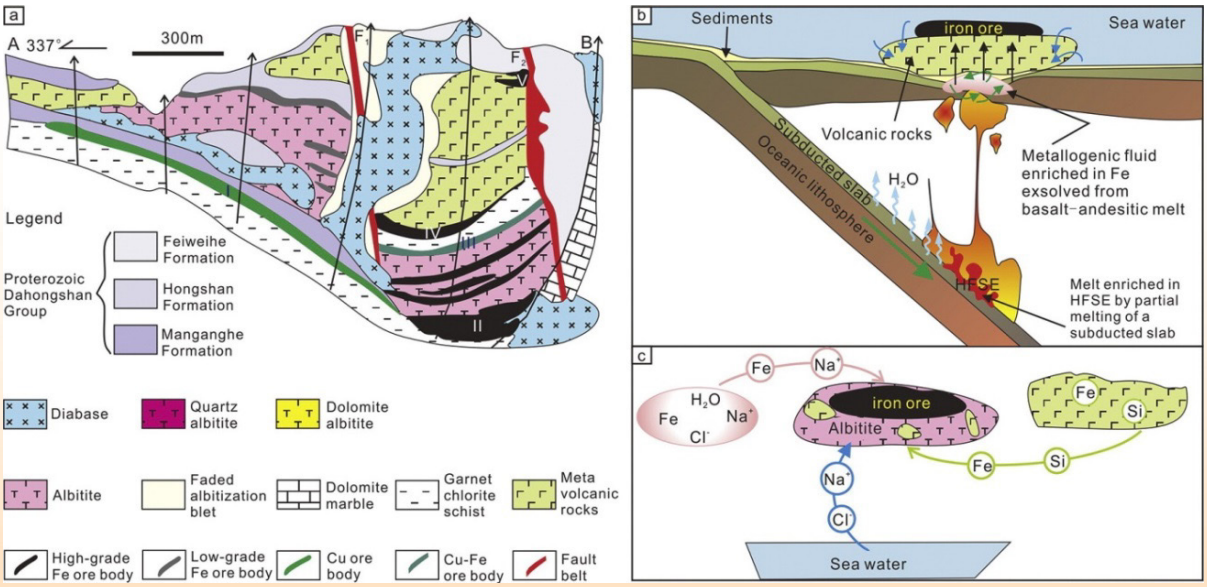




Ye Z et al., 2017–Geophysical Research Letters DOI: 10.1002/2017GL075141

Oldest volcanic-hosted submarine iron ores in South China: Evidence from zircon U–Pb geochronology and geochemistry of the paleoproterozoic Dahongshan iron deposit

ABSTRACT: The Dahongshan iron deposit is hosted in the Paleoproterozoic submarine metavolcanic rocks of the Dahongshan Group in the Yangtze Block, South China. LA-ICP-MS dating of hydrothermal zircon grains from the genetically associated albitite and dolomite albitite show ca. 2008 Ma ages that are consistent with the zircon ages from the host metavolcanic rocks (ca. 2012 Ma), and postdated the post-ore diabase dike (ca. 1724 Ma), marking the Dahongshan iron deposit as the oldest submarine volcanic-hosted deposit so far as known. The ore-hosting metavolcanic rocks in the Dahongshan deposit have low Ni, Cr and Co contents, suggesting the fractionation of olivine, clinopyroxene and plagioclase within the magma chamber. The major and trace element features of the alkaline to tholeiitic metavolcanic rocks are consistent with highdegree partial melting of the mantle wedge metasomatized by melts enriched in high field strength elements (HFSEs), which were derived from the subducted slab in volcanic arc setting. Based on an evaluation of the morphology of orebody, ore fabrics, petrology and melt-fluid inclusions, as well as the geochemical characteristics of the major ore mineral (magnetite), we correlate the iron mineralization in the Dahongshan deposit with hydrothermal process induced by the high-temperature, high-salinity and Fe-rich brines derived through magmatic exsolution. The similar characteristic of Ce and Eu anomalies of the Dahongshan iron deposit and banded iron formations (BIFs) suggest that the Dahongshan deposit was formed in reducing environment, although the two types of iron ores were generated through distinct processes with hydrothermal processes dominating for the submarine volcanic-hosted iron deposits whereas the BIFs were formed through chemical precipitation.

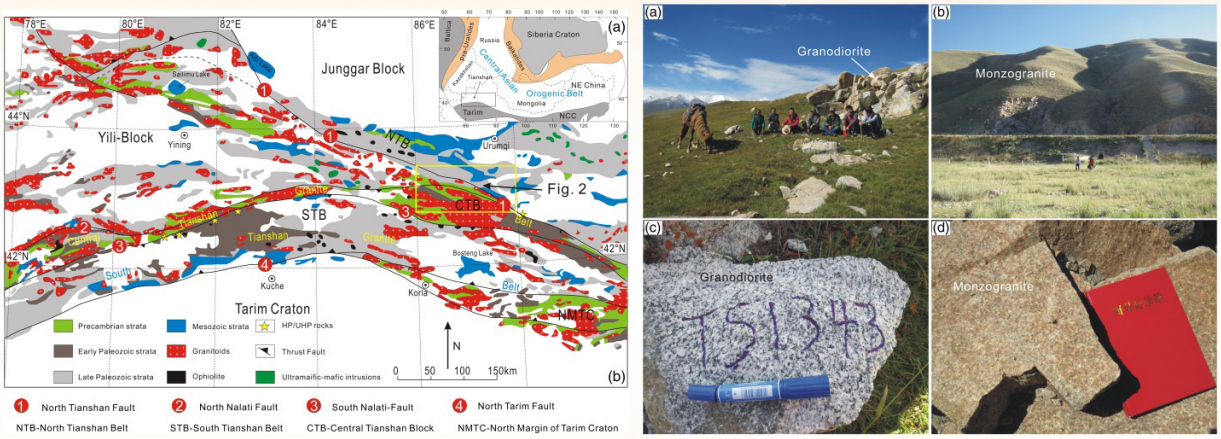


Kou CH et al., 2017–Gondwana Research 2017, 49: 182–204

Geochronology, petrogenesis, and tectonic significance of the latest Devonian–early Carboniferous I-type granites in the Central Tianshan, NW China

ABSTRACT: The latest Devonian–early Carboniferous granitic intrusions in the Central Tianshan block are

composed mainly of monzogranites and granodiorites. Here we present the petrology, geochemistry, and in situ zircon U–Pb ages and Hf isotopes of these intrusions. Bulk geochemistry suggests that the monzogranites and granodiorites are high-K, calc-alkaline, I-type granites. LA-ICP-MS zircon dating shows that the monzogranites and granodiorites formed at ca. 362 Ma and ca. 354 Ma, respectively. They are characterized by relatively high initial 176Hf/177Hf ratios (0.282571–0.282764) and positive εHf(t) values (+2.1 to +7.2). We interpret them to have been derived from partial melting of the Mesoproterozoic metamorphic basement of the Tianshan block and a significant addition of juvenile material. Compared to the monzogranites, the granodiorites are characterized by higher Sr (373–599 ppm), low Y (12.5–20.5 ppm), and Yb (1.21–2.04 ppm) contents, with relatively higher Sr/Y (26–32) ratios, analogous to those of modern adakitic rocks. The differences in geochemical characteristics between the monzogranites and granodiorites may reflect differences in the P–T conditions experienced by the two lithologies during partial melting. We propose that the latest Devonian monzogranites were possibly generated by partial melting of the Tianshan Mesoproterozoic basement rock with an influx of juvenile material in an arc setting. However, the granodiorites were likely related to the slab roll-back of subducted north Tianshan Ocean during the early Carboniferous.

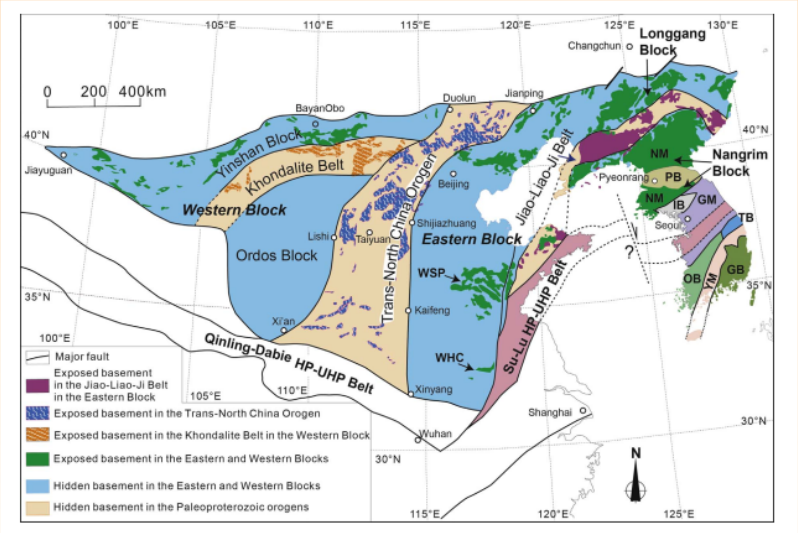


Yin JY et al., 2017– Gondwana Research 2017, 47: 188–199

Archean to Paleoproterozoic evolution of the North China Craton: Preface

ABSTRACT: As one of representative cratons in China, the North China Craton records a long-term and complicated tectonic history, including the formation of Eoarchean continental nucleus, Neoarchean continental crustal growth and reworking, Paleoproterozoic amalgamation of micro-blocks and formation of orogenic belts related to the Columbia supercontinent, and formation of late Paleoproterozoic to early Neoproterozoic rifts. In recent years, extensive geochemical, geochronological, magmatic and metamorphic, structural, and geophysical investigations have been carried out on the North China Craton, which have resulted in a series of new achievements and some percussive interpretations of the Precambrian continental crustal formation and evolution. These new data and results allow us to make a correct judgment for organizing this special issue in which representative and creative experts currently working in the craton exhibit outcomes of their research on the craton. Thirty-nine contributions have been collected in this special issue, which provide insightful understanding of the components, magmatism and metamorphism, metallogeny, and tectonic evolution of the North China Craton, and give an insight into discussion

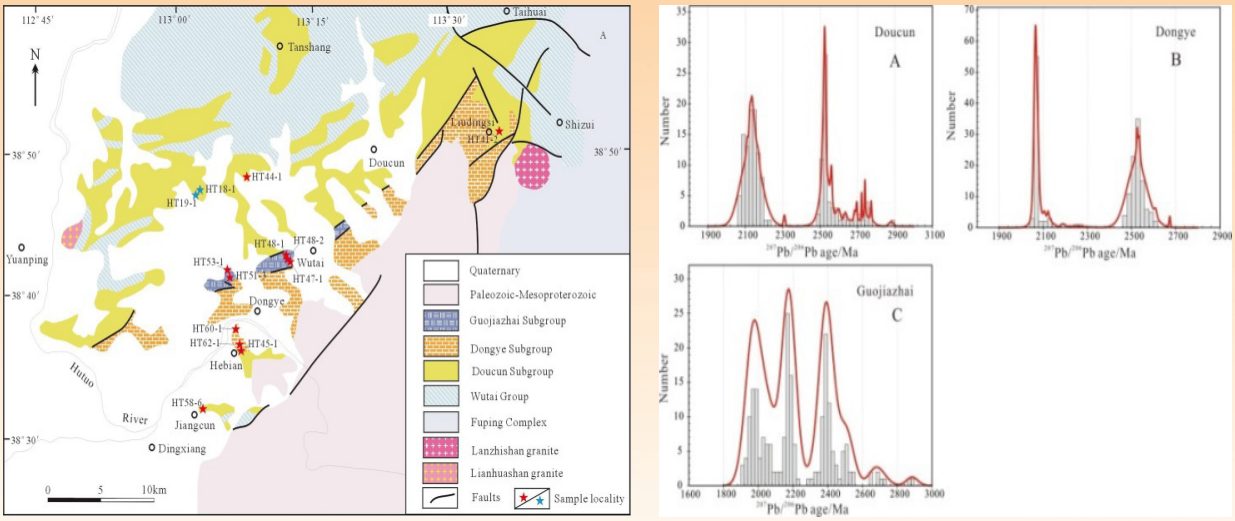
about some key issues on the basis of new data and interpretation. Such a special issue will not only make a timely addition to the literatures on the Precambrian research field, but will also open a new window through which the international geological community will adequately understand what major advancements have been obtained in the Precambrian geology of the North China Craton and what issues are still unresolved and controversial at present.



Liu FL et al., 2017– Precambrian Research 2017, 303: 1–9

Zircon U-Pb ages and Lu-Hf isotope compositions from clastic rocks in the Hutuo Group: Further constraints on Paleoproterozoic tectonic evolution of the Trans-North China Orogen

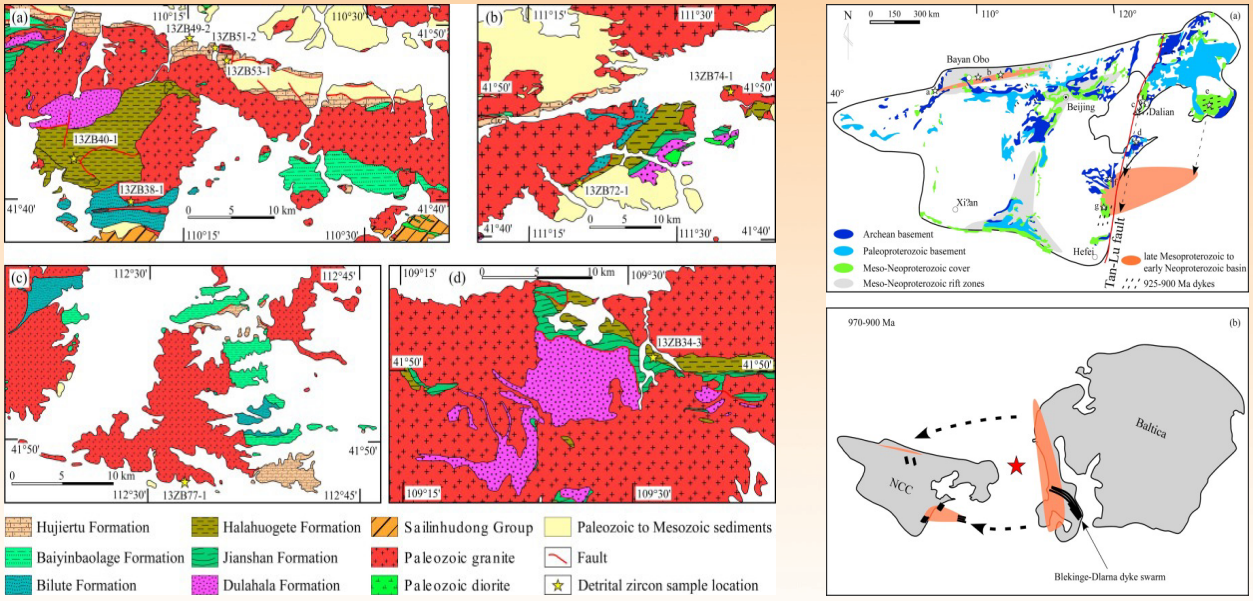
ABSTRACT: The Hutuo Group, as one of the classic examples of Paleoproterozoic strata, plays an important role in establishing evolutionary processes in the Trans-North China Craton. In this contribution, we present petrologic, detrital zircon U-Pb ages and Lu-Hf isotopes from three subgroups of the Hutuo Group. Sandstones in the Doucun and Dongye Subgroups are dominated by Q (monocrystalline and polycrystalline quartz) and F (K-feldspar and plagioclase) with minor lithic fragments, suggesting that the detrital components were mainly derived from both the continental block and recycled orogen. In contrast, clastic components in the Guojiazhai Subgroup are mainly Q and lithic fragments, indicating they were derived predominantly from the recycled orogen. The ages of detrital zircons from sandstones in the Doucun and Dongye Subgroups are mainly concentrated at ca. 2.5 Ga and 2.2–2.1 Ga with minor 2.7 Ga zircons also present which indicates they were dominantly sourced from 2.5 Ga Wutai, Fuping and Zanhuang Complexes, and Paleoproterozoic intrusives. The Guojiazhai Subgroup displays a different zircon age population of ca.2.4 Ga, 2.2–2.1 Ga and 2.0–1.9 Ga, which indicates likely derivation from Paleoproterozoic intrusives in the Wutai, Lüliang and Hengshan areas. Based on the observation that sandstone clastic components in the Doucun and Dongye Subgroups are dominantly quartz, feldspar and sedimentary lithic fragments, but not volcanic lithics, we propose that they were deposited in a rift-related setting. Zircons from the lower sequence of the Hutuo Group yielded a young population of 2140 Ma. Considering the volcanic rocks of 2140 ± 14 Ma at the base of the group and 2.2–2.0 Ga magmatism along the TNCO, we propose that Doucun and Dongye Subgroups formed at 2.2–2.0 Ga. The youngest, ca. 1.9 Ga, zircons in the Guojiazhai Subgroup indicate this Group was deposited during closure of the rift at 1.9–1.8 Ga. The two stage model ages of the detrital zircons mainly range from 2.6 to 2.9 Ga with a minor ~2.5 Ga contribution. Therefore, we infer that 2.6–2.9 Ga represents a period of intensive crustal growth in the Trans-North China Orogen, but that some degree of crustal growth continued to ~2.5 Ga.



Du LL et al., 2017– Precambrian Research 2017, 303: 291–314

Detrital zircon U-Pb and Hf isotopic and whole-rock geochemical study of the Bayan Obo Group, northern margin of the North China Craton: Implications for Rodinia reconstruction

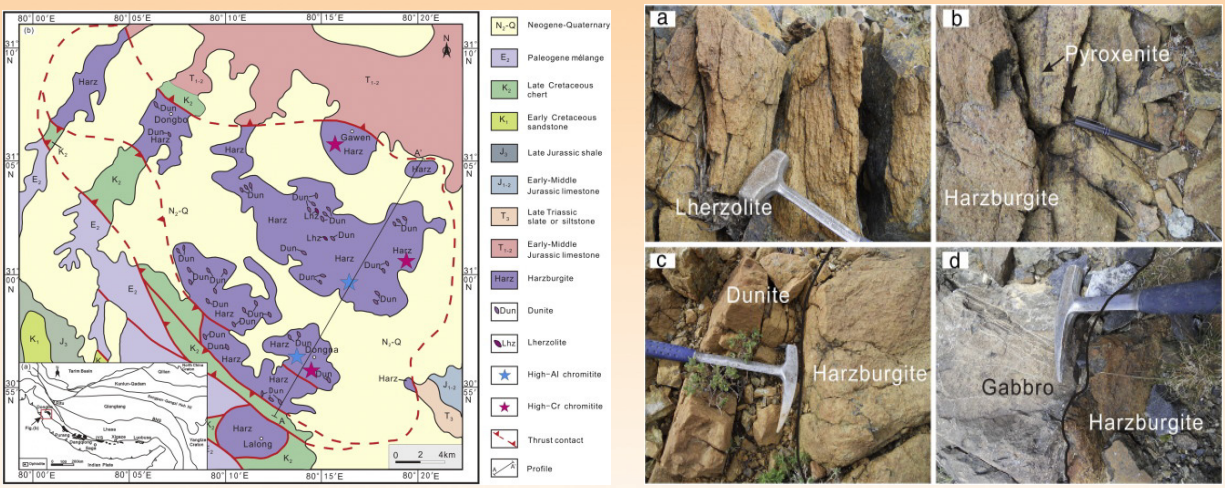
ABSTRACT: The Zha'ertai-Bayan Obo-Huade rift zone is located in the northern margin of the North China Craton (NCC), where rift-related supracrustal successions are divided into the Langshan, Zha'ertai, Bayan Obo and Huade groups from west to east. The Bayan Obo Group unconformably overlies the Late Neoarchean to Paleoproterozoic basement rocks and has been subdivided into three successions by two prominent unconformities. Depositional ages of the lower, middle and upper succession can be constrained in the period of 1.81–1.65 Ga, 1.56–1.35 Ga and 1.19–0.92 Ga respectively based on ages of the youngest detrital zircons and latter intrusions. Geochemistry of the meta-sedimentary samples suggest that most of them were directly sourced from intermediate to felsic magmatic and metamorphic rocks and only the Halahuogete samples from the middle succession display reworking features. U-Pb ages of detrital zircons from the group yielded age peaks of 2.52–2.48 Ga, 1.95–1.85 Ga, 1.74–1.61 Ga, 1.55–1.53 Ga, 1.37–1.34 Ga and 1.18–1.13 Ga. The late Neoarchean to middle Paleoproterozoic detrital zircons are documented in the lower and middle successions and are derived from the ca. 2.5 Ga Guyang and Xi Ulanbulang areas and ca.1.9 Ga Halaqin and Liangcheng areas in the Yinshan Block. The late Paleoproterozoic detrital zircons with low εHf(t) values from the Bilute Formation are interpreted to be sourced from the coeval rift-related granitic plutons and volcanic rocks in the northern NCC. On the other way, detrital zircon age patterns of the late Mesoproterozoic to early Neoproterozoic sedimentary units at the northern and southeastern margins of the NCC are similar with those from the western and northern margin of the Fennoscandian shield. Combined with recent paleomagnetic and geological data, we infer that the NCC and Baltica have not separated until 0.89 Ga in the Rodinia supercontinent.

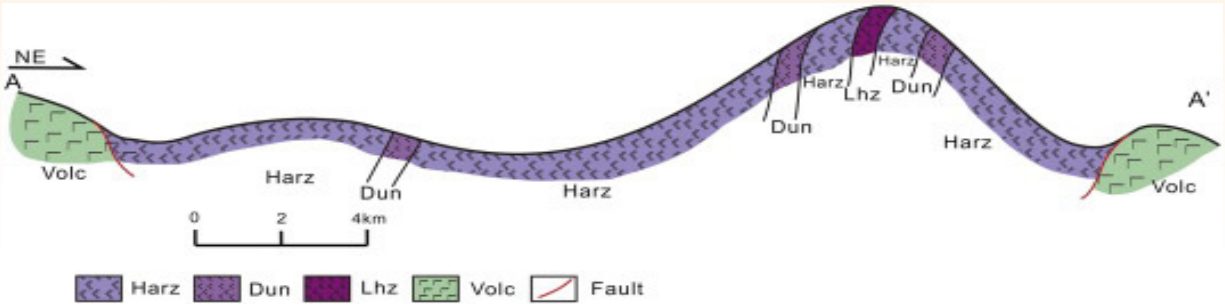


Liu CH et al., 2017– Precambrian Research 2017, 303: 372–391

High-Al and high-Cr podiform chromitites from the western Yarlung-Zangbo suture zone, Tibet: Implications from mineralogy and geochemistry of chromian spinel, and platinum-group elements

ABSTRACT: On the basis of their mineral chemistry, podiform chromitites are divided into high-Al (Cr# = 20–60) (Cr# = 100 *Cr/(Cr + Al)) and high-Cr (Cr# = 60–80) varieties. Typically, only one type occurs in a given peridotite massif, although some ophiolites contain several massifs that can have different chromitite compositions. We report here the occurrence of both high-Cr and high-Al chromitite in a single massif in China, the Dongbo mafic-ultramafic body in the western Yarlung-Zangbo suture zone of Tibet. This massif consists mainly of mantle peridotites, with lesser pyroxenite and gabbro. The mantle peridotites are mainly composed of harzburgites and minor lherzolites; a few dike-like bodies of dunite are also present. Seven small, lenticular bodies of chromitite ores have been found in the harzburgites, with ore textures ranging from massive through disseminated to sparsely disseminated; no nodular ore has been observed. Individual chromitite pods are 1–3 m long, 0.2–2 m wide and strike NW, parallel to the main trend of the peridotites. Chromitite pods 3, 4, and 5 consist of high-Al chromitite (Cr# = 12–47), whereas pods 1 and 2 are high-Cr varieties (Cr# = 73 to 77). In addition to chromian spinel, all of the pods contain minor olivine, amphibole and serpentine. Mineral structures show that the peridotites experienced plastic deformation and partial melting. The mineralogy and geochemistry of the Dongbo peridotites suggest that they formed originally at a mid-ocean ridge (MOR), and were later modified by suprasubduction zone (SSZ) melts/fluids. We interpret the high-Al chromitites as the products of early mid-ocean ridge basalt (MORB) or arc tholeiite magmas, whereas the high-Cr varieties are thought to have been generated by later SSZ melts.

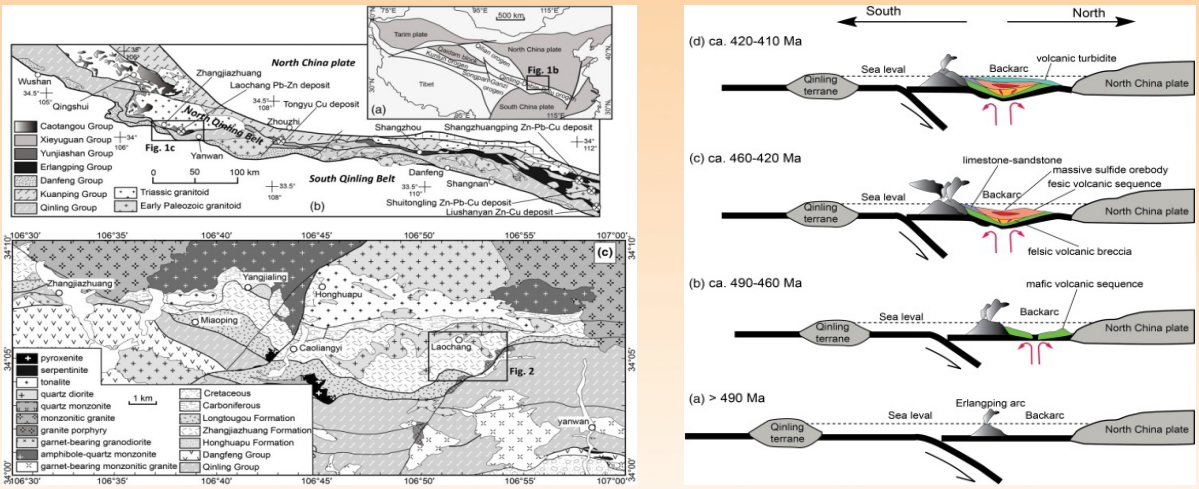




Xiong FH et al., 2017– Ore Geology Reviews 2017, 80: 1020–1041

Stratigraphy and tectonic setting of Laochang massive sulfide deposit in the North Qinling belt, central China

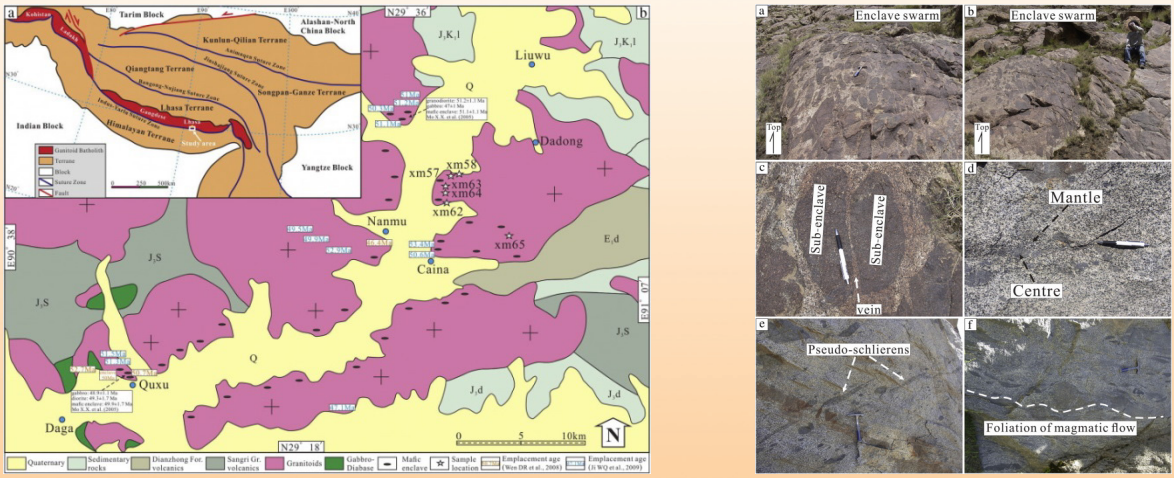
ABSTRACT: The Qinling orogenic belt in central China is the northernmost orogenic collage within the Tethyan domain, which records the evolution of the Paleo-Tethys Ocean. A suite of volcano-sedimentary rocks containing rare fossils and several VHMS deposits is exposed along the North Qinling belt. These units are separated into the Caotangou, Xieyuguan and Erlangping groups from west to east. Systematic studies on the facies and geochemistry demonstrate that the Caotangou Group represents a bimodal volcanic sequence formed in a backarc setting with massive sulfide horizons closely associated with a siliciclastic-felsic volcanic sequence. SHRIMP and LA-ICPMS zircon U-Pb data from rhyolite and tuff of the Caotangou Group indicate that the volcanism took place between ca. 440–406 Ma, which is similar to the dacite and andesitic basalt of the Xieyuguan Group. The Precambrian xenocrystic zircon grains suggest that the subduction-related crustal source of those volcano-sedimentary rocks in the North Qinling belt is closely related to the Qinling Group. Based on the combination of previous fossil ages, U-Pb dating of volcanic rocks and geochemistry of lavas and sulfides, we suggest that a southward-facing subduction-accretionary system developed along the southern margin of the North China plate during 490– 410 Ma. Subduction-related calc-alkaline magmatism continued until at least ca. 410 Ma before collision of the arc with the Qinling terrane to the south during the Early Devonian led to the continent-continent collision between the Qinling terrane and North China craton in the Late Carboniferous.



Yan Z et al., 2017– Ore Geology Reviews 2017, 81: 96–111

Evidence of magma mixing identified in the Early Eocene Caina pluton from the Gangdese Batholith, south Tibet

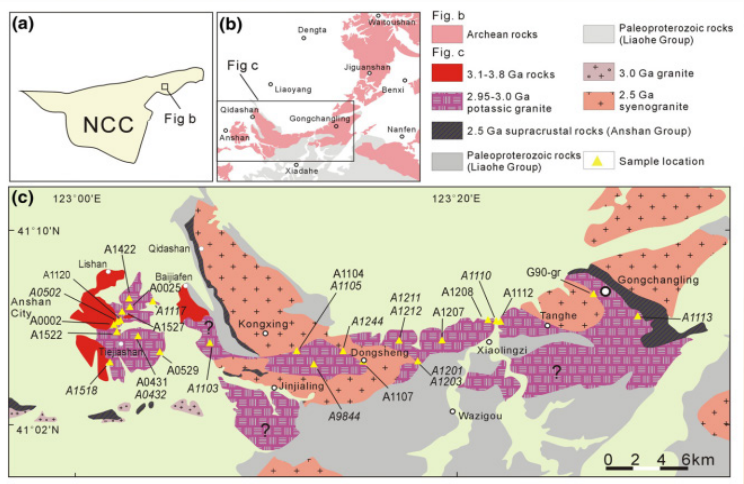
ABSTRACT: Abundant mafic enclaves are enclosed within the Quxu batholith in the eastern Gangdese magmatic belt, southern Tibet. This study focuses on the petrogenesis and affinity of these mafic enclaves with their host diorite-granodiorite, as well as their mechanism of formation and tectonic setting. Zircon U-Pb geochronological and Hf isotopic results demonstrate that the mafic enclaves and their hosts were emplaced at ~50 Ma, with similar positive zircon εHf(t) values of ~9–12. Al-in-hornblende geobarometry suggests that the mafic enclaves and their hosts intruded at depths of 11–13 km. The geochronological and geochemical data point to a magma mixing process resulting in the formation of the host rocks and mafic enclaves. Our conclusion is further supported by mesoscopic field and microscopic thin-section observations consistent with magma mixing. We argue that the emplacement of these rocks within the eastern Gangdese Belt was triggered by slab rollback of the subducted Neotethyan oceanic lithosphere during the early phases of the Indo-Asian collision.



Ma XX et al., 2017– Lithos 2017, 278–281: 126–139

The Mesoarchean Tiejiashan-Gongchangling potassic granite in the Anshan-Benxi area, North China Craton: Origin by recycling of Paleo- to Eoarchean crust from U-Pb-Nd-Hf-O isotopic studies

ABSTRACT: Mesoarchean and older potassic granites are important indicators of recycling of ancient continental crust early in Earth's history. This study of integrated whole rock and zircon geochemistry and geochronology reports the age and identification of the source materials of the >200 km^2 Mesoarchean Tiejiashan-Gongchangling granite in the Anshan-Benxi area, North China Craton, the largest pre-Neoarchean granite domain in the craton. SHRIMP U-Pb zircon dating on 15 samples indicates the magmatic crystallization of the granites between 2.95 and 3.0 Ga and reveals a superimposed tectonothermal event at ~2.91 Ga. The granites are characterized by high SiO_2 and K_2O, low CaO, FeOt, MgO and TiO_2 with peraluminuous features. They show large variations in (La/Yb)n and strong negative Eu and Ba anomalies and Nb, P and Ti depletions. Whole rock Nd and magmatic zircon Hf isotopic compositions show large variations, but with most having εNd(t) and εHf(t) values <0, with tDM(Nd) and tDM(Hf) values varying from 3.3 to 3.9 Ga and 3.3 to 4.0 Ga, respectively. Magmatic zircons without very strong lead loss (discordance ≤20%) have $\delta^{18}O$ values of +3.14 to +8.39. 3.3–3.7 Ga xenocrystic zircons occur in some samples. The granite formed as a result of recycling of Paleo- to Eoarchean continental material in an intracontinental environment, with little if any contribution from Mesoarchean mantle sources. The sources could be predominantly unaltered ancient gneisses, together with yet to be identified Paleo- to Eoarchean materials affected by early low temperature alteration (weathered rocks or clastic sediment).

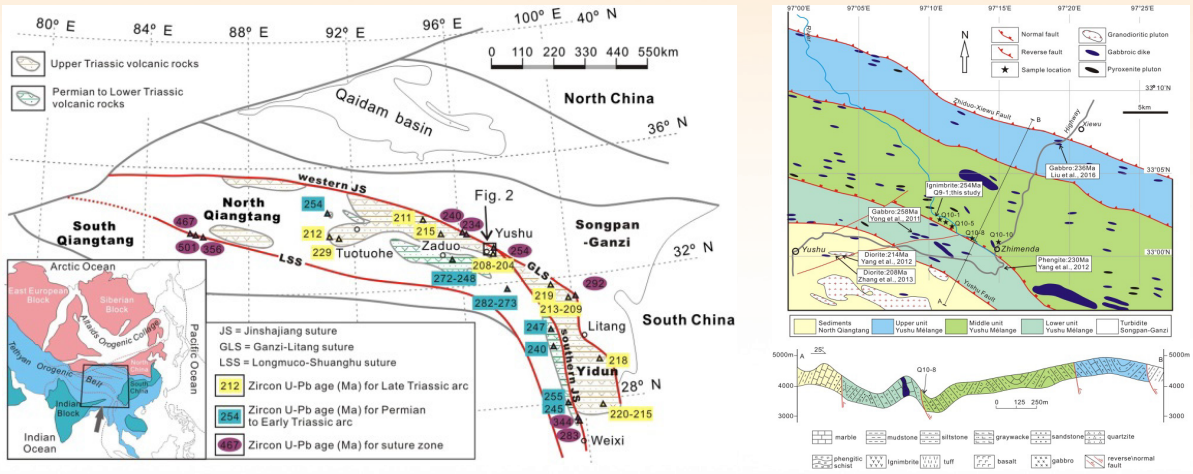


Dong CY et al., 2017– Lithos 2017, 290–291: 116–135

Permian back-arc basin basalts in the Yushu area: New constrain on the Paleo-Tethyan evolution of the north-central Tibet

ABSTRACT: The Paleo-Tethyan tectonic evolution of north-central Tibet remains controversial, particularly regarding the nature and extension of associated sutures. The Yushu mélange, located in the junction part of the western Jinshajiang, the southern Jinshajiang and the Ganzi–Litang sutures, is a key area to reveal the Paleo-Tethyan tectonics of this area. This study presents new geochronological and geochemical data for the Zhimenda volcanic suite of the Yushu Mélange. These rocks preserve a record of back-arc magmatism along the northern margin of the

North Qiangtang Block. The Zhimenda volcanics are composed of ignimbrite, basalt, and porphyritic tuff intercalated with terrigenous clastic rocks. Zircon $^{206}Pb/^{238}U$ ages of the ignimbrites indicate they formed at ~254 Ma. The basalts are relatively enriched in large-ion lithophile elements and depleted in high field strength elements. Their high MgO, Ni, and Cr contents, relatively high Sm/Yb and Rb/Nb values, and positive zircon εHf(t) and bulk εNd(t) values suggest they were derived from the partial melting of a depleted subcontinental lithospheric mantle source metasomatized by hydrous fluids. The Zhimenda basalts are geochemically similar to back-arc basin basalts in the Okinawa Trough. They were erupted related to subduction of the Longmuco-Shuanghu Paleo-Tethyan oceanic plate beneath the North Qiangtang Block. We propose that the Yushu Mélange converges with the Ganzi–Litang Suture Zone to the east, rather than with the Jinshajiang Suture Zone to the southeast, and that a huge Permian trench–arc–back-arc system developed in north-central Tibet.



Zhang HR et al., 2017–Lithos 2017, 286–287: 216–226

5.4 Results of Nature Science Foundation Projects Completed in 2017

Paleosecular variations and environmental magnetism of Holocene lake sediment from the monsoon marginal zone in east China (chief researcher: DONG Jin)

High resolution paleosecular variation (PSV) study was carried on lacustrine sediment from Huangqihai Lake, Daihai Lake and Dali Lake, Inner Mongolia. The result of rock magnetic analysis shows, three lacustrine sections contain similar magnetic minerals, which is dominated by magnetite, with little hematite goethite and pyrite. The size of the magnetic minerals is single domain (SD) and multi-domain (MD), which are beneficial to record paleosecular variation. Normal sedimentary fabrics suggest the sequence had not been disturbed. Different principal component analysis was adopted to the alternating demagnetization curves. In addition, the natural remanent magnetization was normalized by some magnetic parameters, respectively, such as anhysteretic remanent, isothermal remanent and susceptibility. In contrast, magnetic direction can better reveal paleosecular variation than relative paleointensity. BY section from Dali Lake reveals 4.5-9 ka paleosecular variation. The curve of inclination shows three peaks, which is respectively B1 (50 cm, 5.6 ka), B2 (104 cm, 7.3 ka), B3 (190 cm, 9.4 ka). The curve of declination shows four peaks, which is respectively B1' (44 cm, 5 ka), B2' (60 cm, 6.2 ka), B3' (110 cm, 7.6 ka), B4' (166 cm, 9.4 ka). By comparison, the PSV curves of BY section are similar with that of Erlongwan Lake, Biwa Lake and East China Sea,

and have some difference with Shuangchilin Lake and Huguangyan Lake. This difference is possible that they are so far that their internal earth structures are different.SG section from Daihai Lake reveals 5-9 ka paleosecular variation. The curve of inclination shows three peaks, which is respectively S1 (90 cm, 4.6 ka), S2 (140 cm, 6.2 ka), S3 (250 cm, 9.4 ka). The curve of declination shows four peaks, which is respectively S1' (60 cm, 4.6 ka), S2' (180 cm, 7ka), S3' (250 cm, 8.2 ka). The PSV curves of SG section are similar with that of other region. At the same reason, SG section has some difference with Shuangchilin Lake and Huguangyan Lake. EWD section from Huangqihai Lake reveals paleosecular variation since 3 ka. The curve of inclination shows two peaks, which is respectively E1 (60 cm, 1.4 ka), E2 (120 cm, 2.6 ka). The curve of declination shows two peaks, which is respectively E1' (75 cm, 1.7 ka), E2' (130 cm, 7ka). Although the record is of relatively short duration, it could be contrasted with other regions.

Spatial distribution, transition mechanism and timing of late Mesozoic crustal contraction and extension in the southeastern China-Mongolia border (chief researcher: GUO Lei)

Late Mesozoic crustal contraction and extension is one of the most remarkable structural features in NE Asia continent. But the detailed transition process, mechanism and time of the transition from contraction to extension are not clear. Based on our latest progress in the Daqing Shan area, this project selected the multiple periods of contractional and early Cretaceous extensional structures in the southeastern China-Mongolia border area and South Mongolia as subjects. According to the study of detailed structural analysis, geochronology and P-T analysis of deformation, we recognized two major contractional structures (late Permian to early Triassic, Middle to late Jurassic) and their trace, deformation pattern and timing. They afforded evidences for early crustal thickening. And, more importantly, we identified numerous early Cretaceous (~130Ma) asymmetric syn-extensional granitic domes. These domes have a unified top-to-the-NW shearing and similar extension time.Together with early developed metamorphic core complexes, they formed huge basin and range structures during collapse of thickened crust caused by the closure of Mongol-Okhotsk Ocean. Combined with study of related magmatism, it implied the transition from contraction to extension is the process from deep to shallow level. Deep level extension started at 150-140Ma and shallow level peak extension occurred at 130-120Ma, which suggested this process is closely related to magmatism.

Middle-Late Ordovician vertebrate fauna in Bachu County, south Xinjiang Province (chief researcher: GUO Xianpu)

To date, rather rare research of the Ordovician vertebrate fossils has been carried out in the world. The only reports are Ordovician vertebrate fossils found in North America (USA, Canada), South America (Bolivia) and Australia, and one Ordovician vertebrate fossil fragment in China. In the China locality, Bachu of Xinjiang Province, a lot of vertebrate fossils have been found since 2011. It is this discovery that made us have successively applied for a grant from the National Nature and Science Foundation Commission of China and it is possible for our detailed studies for the Ordovician vertebrate fossils of the area. The research includes the external morphological characters of these fossils including the orbits, pineal body, sensory canals system, external branchial openings and naso-hypophysail opening and the histological research of the external skeletons sections. Based on these results the vertebrate structures of taxonomy will be studied, and showing the position at the biological pedigree, and the relations of evolutionary between the Cambrian-Ordovician and Silurian-Devonian and ecology research, the vertebrate biogeographic provinces according to the divisions of the taxonomy and biology. The paper on these fossils is the first report on the possessing detailed external skeleton in China. The systematic paleontology description has been completed here, and the histological of the fauna will be introduced in a succession report. Up to now, one subclass (Bachuiaspida), two Orders (Bachuiaspidida, Papeongaleaspidida), two Families (Bachuiaspidae, Paleogaleaspidae)

and four Genera (Bachuiaspis, Brevicaraspis, Cyclocephalaspis, Paleogaleaspis) have been determined, four papers (in addition to one book) have been published.The members of the project have presented the results in the international symposium. The project of Bachu, Xinjiang shows the major results as follows: 1. it is the transitional vertebrate fauna from Cambrian-Ordovician to Silurian –Devonian in evolution of the agnathans; 2. it is quite different from the external morphology and skeleton structures of the agnathans in South America, North America and Australia. So, the vertebrate fauna should be referred to as a special and independent vertebrate paleogeographical realm.

Early Cretaceous vertebrate fauna from the Ordos Basin (Inner Mongolia) and the related stratigraphic relation (chief researcher: JI Shu'an)

Early Cretaceous vertebrate fossils from the Ordos region in Inner Mongolia are the very important part of the "Psittacosaurus fauna" of the same geological age across northern China. But no further field expedition and studies about this fauna have been organized since the late 1980s to mid 1990s. We have made a series of field investigation and confirmed nearly 30 localities that the vertebrate fossils are exposed. Furthermore, we collected rich fossil vertebrate specimens containing some characteristic clades. (1) A new species of the turtle genus Sinemys is named, which shows the high diversity of turtles in this fauna. (2) The convincible pterosaurs are firstly found, one of which is represented by an incomplete dentary and included within the family Dsungaripteridae. (3) The ankylosaur skeleton is also firstly collected for the first time in Ordos region. And the gastroliths and scale impressions of ankylosaur dinosaurs are the first example in China. (4) A well-preserved specimen of stegosaur ilia and sacrum adds more features on Wuerhosaurus ordosensis. (5) About 30 sauropod teeth provide the evidence about the existence of cf. Euhelopus sp. in this region. (6) Some large theropod teeth and limb bones are discovered. (7) An Early Cretaceous protoceratopsid specimen is described and discussed. (8) A new locality bearing the Late Cretaceous protoceratopsid fauna is first uncovered, which enlarges the geographical distribution of this fauna. (9) Some new understandings about the correlated dinosaur clades from western Liaoning are also gained. In conclusion, the pterosaurs, ankylosaurs and large theropods are firstly discovered, and new types of turtles, stegosaurs and sauropods are also distinguished. These enlarge the content of the Early Cretaceous dinosaur fauna of Ordos Basin.

The petrological and geochronological studies on varied magmatic evolutions in early stages of the Izu-Bonin-Mariana Island-arc (chief researcher: LI Yibing)

The Izu-Bonin-Mariana forearc regions proserve and expose varied volcanic rocks, such as fore-arc basalts (52-50 Ma), boninites (48-44 Ma), calc-alkali high-Mg andesites (45-44 Ma) and arc tholeiitic basalts-andesites (44-40 Ma). The geochemical characteristics of the fore-arc basalt are similar to the Inter-Ridge basalt. Boninite could be generated by high degree partial melting of depleted mantle source fluxed by water-rich slab-derived melts in a hot subduction environment. On the other hand, arc tholeiitic basalt could be generated by partial melting of depleted mantle source fluxed by water-rich slab-derived fluids in a cold subduction environment. Calc-alkali high-Mg andesites are the product of magma-mixing between boninite and arc tholeiitic basalt. It is difficult to judge that the boninite really represent the magmatism in the beginning of the initial subduction. Because a hot spot, an inter-ridge subduction or fore-arc basin spreadingalso can supply a high temperature subduction zone. Another possibility, due to sudden changes in the direction of the plate movement, the subduction initiation will begin along the transform fault in an Inter-ridge ridge system. Jurassic and Cretaceous plutonic zircons were separated form IODP Leg 352 seafloor drilled volcanic rocks. If, 164-165 Ma age maybe represent the ages of pre-existing ancient arc or continent crustal materials as the basement of Paleo-IBM, it seems reasonable to suppose that the subduction initiation of IBM existed along the ancient continent margins.

Determination of Songduo suture zone in Lasha terrain and Indosinian Orogeny of Qinghai-Tibet Plateau (chief researcher: LI Zhaoli)

Qinghai-Tibet (Q-T) Plateau is recognized as the natural laboratory for geodynamics research. As known, the Q-T Plateau is the assembly of several blocks. Since suture zone is the front end of plate collision, it is important to determine the suture zone in the Q-T Plateau. This project made the studies of the eclogites and the country rocks in the Lhasa block. In this research, (1) we applied for the first time the phase equilibrium simulation method to the study of this common eclogite in the Lhasa block. P-T pseudosection of sample 13SD43 was employed in the NCKMnFMASHTO system. The maximum Xpy in the core of garnet and the maximum Si value in phengite were used to determine the peak metamorphic condition of 610°C, 32 kbar, with a peak mineral assemblage of g+o+law+phn+ru. With the help of phase equilibrium and petrography research, several metamorphic evolution processes of the eclogite could be recognized. Studies show that the eclogites in the Lhasa block probably experienced UHP metamorphism and rapid exhumation to the middle crust, which might have provided new evidence for the existence of the suture zone in the Lhasa block. (2) The model system MnNCKFMASHO was chosen to calculate P-T and P-M(H_2O) pseudosections of the garnet-bearing mica-quartz schist. Garnet isopleths thermobarometry involved plotting compositional isopleths of garnet as contours on a P-T pseudosection, with the combination of contours of saturated H_2O content, thus obtaining estimated peak P-T conditions of 27 kbar, 523/580 ^{O}C and peak mineral assemblages of g-jd-cr-law (+phn+q/coe+H_2O). A comparison with the P-T path and contact relationship in the field of garnet-bearing mica-quartz schist and eclogite shows evidently that garnet-bearing mica-quartz schist and the eclogite it hosted experienced similar subduction and exhumation processes. (3) The 3He/4He ratios of garnet and omphacite in these rocks range from 0.27-0.60 Ra. These ratios are within the range of both mantle-derived and crust-derived helium, suggesting mixed sources. The Songduo eclogites have higher 3He/4He ratios than those observed in eclogites of the Dabie orogen of central China. Such high ratios are typically associated with deep mantle sources. We concluded that deep mantle materials might have been involved in the formation of the Songduo eclogites.

Tectonic feature of the Zhaertai and Bayan Obo Groups at the northern margin of the North China Craton and their relationship with break up of the Columbia supercontinent (chief researcher: LIU Chaohui)

In the Langshan-Zha'ertai-Bayan Obo-Huade rift zone in the northern North China Craton (NCC), the oldest zircons from the basement rocks are 2.95-2.60 Ga, which have εHf(t) values of -13.78 to +11.75, implying a mixing of juvenile material with ~3.1 Ga old crust. The oldest rocks formed at 2.51-2.48 Ga, whose zircon εHf(t) values range from -6.41 to +6.02,indicating recycling of ~2.5 Ga crust. Depositional ages of the lower, middle and upper succession of the Bayan Obo Group can be constrained in the period of 1.81-1.65 Ga, 1.56-1.35 Ga and 1.190.92 Ga. U-Pb ages of detrital zircons from the group yielded age peaks of 2.52-2.48 Ga, 1.95-1.85 Ga, 1.74-1.61 Ga,1.55-1.53 Ga, 1.37-1.34 Ga and 1.18-1.13 Ga. The late Neoarchean to middle Paleoproterozoic detrital zircons are documented in the lower and middle successions and are derived from the ca. 2.5 Ga Guyang and Xi Ulanbulang areas and ca.1.9 Ga Halaqin and Liangcheng areas in the Yinshan Block. The late Paleoproterozoic detrital zircons with negative εHf(t) values from the Bilute Formation are interpreted to be sourced from the coeval rift-related granitic plutons and volcanic rocks in the northern NCC. On the other way, detrital zircon age patterns of the late Mesoproterozoic to early Neoproterozoic sedimentary units at the northern and southeastern margins of the NCC are similar with those from the western and northern margin of the Fennoscandian shield. Combined with recent paleomagnetic and geological data, we infer that the NCC and Baltica have not separated until 0.89 Ga in the Rodinia

supercontinent. The Langshan Group is located in the northeastern margin of the Alxa block and has been divided into four formations, of which the 1st formation deposited in the period of 1.83-1.66 Ga, the 2nd and 3rd formations formed between 1.16 Ga and 0.80 Ga and the 4th formation deposited after 1.17 Ga, whereas part of the previously believed Neoarchean Alxa "Group" deposited in the period of 1.65 Ga and 1.37 Ga. U-Pb ages of detrital zircons from the Langshan Group and the early Mesoproterozoic Alxa "Group" yielded age peaks of 2.51-2.48 Ga, 2.38-2.33 Ga, 1.89-1.81 Ga, 1.79-1.62 Ga, 1.58-1.56, 1.36-1.31 and 1.18-1.17 Ga. Based on the similarities in the stratigraphic sequence and detrital zircon age patterns of the Changcheng, Jixian and Qingbaikou systems, we infer that the Alxa Block was still an integrated part of the NCC in the early Neoproterozoic time.

Multiple metamorphic and partial melting events in the SanJiang complex belt, southeastern Tibetan Plateau (chief researcher: LIU Fulai)

Sanjiang complex belt, SE Tibetan Plateau experienced multiple orogeny and tectonic evolution from Paleozoic to Cenozoic, which provides a well natural laboratory for investigating complex metamorphism, magmatism and anatectic processes. By combined studies of petrology, phase equlibria modeling and geochronology, this project has obtained important achievements as follows: (1) Diancang Shan-Ailao Shan and Gaoligong-Tengchong-Ruili complex belts are two typical HP granulite facies belts, which experienced Triassic (246-230 Ma) and Paleocene-Eocene (60-36 Ma) HP granulite facies events. (2) The Triassic metamorphism was characterized by a clockwise P-T-t path with peak and post-peak P-T conditions of 690-760°C and 12-15 kbar, and 670-760°C and 5.0-6.5 kbar, respectively, indicating both belts are suture zones of Paleo-tethys oceanic closure. (3) The Paleocene-Eocene metamorphism was also characterized by a clockwise P-T-t path with peak P-T conditions of 800-870°C and 11-15 kbar at 60-36 Ma, subsequent post-peak of 810-880°C and 5.5-8.5 kbar at 36-30 Ma, and late cooling stage of 521-648°C and 4.0-5.0 kbar at 25-20 Ma, indicating that both belts underwent Paleogene continent-continent collision orogenic event. (4) During the complex orogeny, both belts experienced multiple partial melting events, which occurred at 245-211 Ma and 39-18 Ma, and related to the isothermal decompression stages of the exhumation of the orogenic belts. (5) Abundant detrital zircon U-Pb age data revealed that the protoliths of the voluminous metasedimentary rocks formed at Paleozoic (<452-520 Ma), rather than Paleo- to Meso-proterozoic as reported by previous studies. (6) At least six episodic granitic magmatic events were identified in the two belts, which occurred at Paleoproterozoic (~1875 Ma), Neoproterozoic (850-750 Ma), Cambrian-Ordovician (500-450 Ma), Permian-Triassic (300-220 Ma), Jurassic-Cretaceous (170-110 Ma), and Paleogene (55-25 Ma), and were related to the breakup of the supercontinents, Tethys oceanic evolution, and continent-continent collisional orogeny. (7)Abundant metamorphic and anatectic monazite, xenotime and thorite were found in metasedimentary rocks and partial melting veins, which formed at 36.5-19.6 Ma with temperature conditions of 710-815°C. These newly results have important significance for revealing the complicated tectonic evolutionary of the Sanjiang complex belt from Triassic until Oligocene.

The Tuchengzi-Zhangjiakou Fms and basin evolution at the transition of the Jurassic-Cretaceous in Yanshan Mts and implications of the rift system in northern area of North China (chief researcher: LIU Yongqing)

NE Asia on the transition of J/K was previous considered as multi-direction assembly center in term of worldwide tectonic background, as a relult, numerous of results focused were published in recent years and attracted great attention worldwide, however, questions still remained. This research maked a study on the following issues unsolved befor in Yanshan Mts and neighbouring areas: spacial-temporal distribution and stratigraphic framework of the Tuchengzi-Zhangjiakou Fms,and tectonic interpretations of basin evolution and supporting evidences,finaly,a

sedimentary-tectonic model.Furthermore, a dicussion of major geological events and basin evolution will be concered. Current study indicates that the Mesozoic periodically evolution of basin, sedimentary palaeogeography and tectonic settings. A series of evidence of stratigraphy,basin and fills and volcanics et al support an extension tectonic background and great NE Asia rifting system along the western Great Xinganling Mt and northern region of Yanshan Mt in a NE trending.Futhermore, a synthesized research of palaeo-tectonic, palaeogeography and palaeoecology within NE Asia rifting system of J/K transion is helpful in better understanding the rift system proposed by this research and tectonic environment in northern areas of North China or NE Asia,and co-evolution and feedback of terrestrial biota replacements and environment changes in the Mesozoic.The latter is also key contents, i.e."breakup of NCC and terrestrial biota evolution" ,basic research center project of NSFC,as well as the worldwide focus.

Petrogenesis of Permian A-type granites in the middle segment of the border between Mongolia and China and their tectonic implications (chief researcher: TONG Ying)

The Central Asian Orogenic Belt (CAOB) is known to be the Earth's largest Phanerozoic accretionary orogenic belt. Its southern margin, particularly in the southern Mongolia and Inner Mongolia, shows an extensive distribution of alkaline granites. Study of these granites could shed light on long-debated hypotheses on the late Paleozoic tectonic evolution of this region. In this Project, more than six new alkaline volcanic rocks, alkaline granites had been recognized. Detailed zircon age determination and geochemical analysis had been performed on these rocks. The geochemical and Nd-Hf isotopic signatures suggest derivation by partial melting of mantle-derived juvenile material, and followed by fractional crystallization. They all formed at Permian and show chemical characteristics typical of A-type granites. Coeval alkaline granites from southern Mongolia to northern Inner Mongolia constitute a gigantic (~900 km) Permian (292-275 Ma) alkaline granite belt in the southern CAOB. In addition, from Carboniferous to Permian, the changing of the magma from calc-alkaline to alkaline indict that the tectonic setting must be changed from arc to post-orogen. Meanwhile, from Permian to Triassic, the characters of the A-type granites along the Erlian-Hegenshan ophiolite blet changed from A2- to A2-/A1-type granites, reveals the tectonic setting had already transferred from post-orogen to intraplate. Importantly, the south Mongolia-Erlian-Dongwuqi Permian alkaline(A-type) granite belt can further extend extern to the East and west, consisting of a several thousands of kilometers giant Permian alkaline (A-type) granite belt. It solid prove the regional large-scale post-orogenic extensional setting, shows that the main part of the Paleo Asian Ocean already closed at Permian, and affection of the Mongolia-Okhotsk ocean subduction did not cross the belt at Permian.

Crustal formation and evolution of Archaean Block from the Rauer Group, Antarctica: constraints from geochemistry and zircon U-Pb, Hf-O isotopes (chief researcher: WANG Yanbin)

Granulite-facies rocks in the Rauer Group, Antarctica, represent important suites of rocks exposures for investigating the development of high-grade metamorphic terrains in East Antarctica. Four periods magmatic events (c.3.2Ga, c.2,8Ga, 2.5 Ga; 1.0 Ga) are found by Zircon SHRIMP U-Pb methods. U-Pb zircon geochronology from an ultra-high temperature (UHT, ~1000 °C) granulite-facies metapelite from the Rauer Group, Mather Peninsula, has yielded evidence for two episodes of metamorphic zircon growth, at ~1.00 Ga and ~530 Ma, and two episodes of magmatism in the source region for the protolith sediment, at ~2.53 and ~2.65 Ga, were identified from the zircon cores. Successive zircon growth at ~1.00 Ga and ~530 Ma records a sequence of distinct, widely spaced high-temperature metamorphic and/or anatectic events related to Grenvillian and Pan-African orogenesis. These metamorphic events

in rock from Rauer Group can be correlated with events previously reported for the adjacent southern Prydz Bay and northern Prince Charles Mountains. These Archaean zircon cores have oscillatory growth zoning and possess εHf values between -10 and +4 and δ18O mostly between +2.62 and +5.64‰, suggesting derivation of their precursor magmas from old crust and juvenile materials from mantle. The metamorphic domains have negative εHf values, this means that Archean crust was remelted to generate these domains. The metamorphic effect on zircon Lu-Hf-O and U-Pb isotope systems in UHT metapelite will be evaluate. THf DM ages from cores of zircon grains indicate the metapelite rocks share a ca.2.65-3.36 Ga source that is indistinguishable from that previously reported for parts of the Rauer Group. This study presents the robust geochronological evidence for the timing of UHT metamorphism of the Rauer Group, supporting arguments that the peak UHT metamorphic event occurred at ~559-530 Ma. Such as the degree of crustal recycling or the importance and timing of juvenile(mantle-derived) contributions to the crust. The study will provide an important temporal framework for the correlation of other parts of a complex mosaic of metamorphic terraness from East Antarctica. The new data are to be encourage revised models for Gondwana assembly.

Analyses of seismic data recorded at the different depths of the Donghai 5000m borehole and study of the non-linear properties of seismic waves in different layers and the seismo-tectonics in and around the Tanlu fault (chief researcher: XU Jiren)

Employing high accurate data recorded by seismographs set on the ground (L0) and at the 544.5(L1), 1559.5 (L2), 2545.5 (L3), 4050 meter (L4) depths underground in the deep well in the CCRD Long Term Observatory since 2012, we analyzed the characteristics of seismic waves and the observation ability of the seismographs, investigated qualitatively and quantitatively the signal-to-noise ratio of seismic waves at different deep strata, studied the nonlinear characteristics of seismic waves observed from the borehole. The seismicity around the Tanlu fault region and dynamics on tectonic movement of the Tanlu fault were studied further. The preliminary results suggested that average signal-to-noise ratios of the seimograms at different L0, L1, L2 and L3 depths for earthquakes within 100 kilometers is 24.6168, 81.0152, 91.0714 and 95.0338, respectively, and the average signal-to-noise ratio at L0, L1, L2 and L3 depths for earthquakes within 300 kilometers is 24.1169, 66.7184, 71.8632 and 73.513, respectively. The signal-to-noise ratio is increased with depth, even by several times in some cases. It is indicated that the deep well seismic observation can effectively eliminate the ground interference and noise and recorded more micro events and the high precision seimic phases. The deeper the instrument is, the stronger the ability to eliminate interference and the better the quality of observation data are. The result conforms fully to the expected assumption of the deep well seismic observation. Seismograph with depth of 1500 meters has basically achieved the expected goal eliminating interference and noise at surface. Considering the cost of resources and the success ratio etc., we suggest that It is better to vigorously promote deep well seismic observatory with depth of about 1500 meters in the future. In the study on nonlinear characteristics of seismic waveform, it is found that longitudinal and transverse waves exist arrive difference in time between seismic vertical components, and the amplitude of wave is also not increased with depth of instrument. This may be a reflection of the nonlinear amplitude effect of the seismic waves of different depth rocks. The horizontal vertical spectrum ratio of deep well is used to study the response frequency of nonlinear site, and excellent results have been obtained. Unlike previous studies, we study two different systems and deep ground observation data and research results, develop new advantages of use of observation data from the deep level of innovation; the principle of vertical spectral ratio method; innovation in different depth of the nonlinear field effect. The results of the study fully conform to the expectation.

Sedimentary analysis of the wedge-top basin within ophiolite melange belt in Lajishan Mountains (chief researcher: YAN Zhen)

Systemic field surveying and analysis of the research contents have been done according to the plan of this project. Researchers have published 13 papers and 3 abstracts of meeting, trained 2 Ph.D students, and attended domestic and international academic conference 1 time respectively. The expected goal and results of this project have also been achieved. New results of this project demonstrate that the basement of wedge-top basin overlapping the Lajishan ophiolitic mélange consists of ophiolitic complex and accretionary prism. Basin fills comprise fluvil facies, neritic facies, and deep-sea facies sedimentary assemblages originated from their basement and Cambrian island-arc rocks, showing a southeastward-deepening water paleogeographic environment. The Hualong complex consists of 940-850 Ma and 470-410 Ma arc-granitoids and Neoproterozoic and Silurian sedimentary rocks. The Neoproterozoic granitoids and sedimentary rocks experienced amphibolites-facies grade metamorphism related to arc-magmatism formed by northward subduction of the Proto-Tethyan ocean during Paleozoic. Triassic volcanism, magmatism, sedimentation and mineralization in the south of the Lajishan developed in an active continental margin formed by the northward subdution of the Paleo-Tethyan ocean. These volcanic and magmatic rocks evolved from melting of Mesoproterozoic meta-basic rocks of lower crust with mantle contamination magma. The Devonian strata in the Xiqingshan area along the south of the Lajishan consist of shallow-sea and river delta facies sedimentary assemblages, with a mixed source of continental arc rocks, Hualong Complex, and Yangtz block, which deposited within a foreland basin.The Cambrian-Ordovician volcano-sedimentary assemblages in the South Qilian belt are trench-arc-basin system units, comprising 550-530 Ma MOR-type and 530-480 Ma SSZ-type ophiolites, 550 Ma island arc and accretioanry wedge, and 460-440 Ma continental arc. They were formed by southward and northward in both sides of the Hualong complex during Cambrian and Ordovician respectively. The 460-440 Ma continental arc collided with the Central Qilian belt during the latest Late Ordovician and Silurian-Devonian foreland basin was developed subsequently in the Lajishan and its south side.

Diamond in mantle peridotites - chromitites from Cuba ophiolite and recycled record of deep mantle (chief researcher: YANG Jingsui)

Large amounts of micro-diamonds, highly-reduced minerals and crustal minerals have been recovered from ophiolites and associated podiform chromitites. Compared to the diamonds discovered from kimberlites and ultra-high pressure metamorphic belts, micro-diamond from ophiolites presents a new occurrence of diamond that requires significantly different physical and chemical conditions of formation in the Earth. This NSF program focused on the ophiolites in Cuba to determine: 1) the distribution and tectonic setting of the ophiolites and related chromitites in Cuba; 2) the mineralogy and origin the ophiolitic peridotites and related chromitites. Under the support of the project, we have made the following achievements: (1) fulfilled the field excursion and sample collection of the Mayarí-Baracoa ophiolites and related chromitites in Cuba; (2) microdiamond and moissanite (SiC) have been recovered from the podiform chromitite in Pozanti-Karsanti ophiolite, southern Turkey; their C isotopes have been determined; (3) the third IGCP-649 Workshop and field excursion was held successfully in Cuba; (4)seven papers related to this project were published.

Does the Longmu Co-Shuanghu suture connect with the Changning-Menglian suture? (chief researcher: YANG Tiannan)

A key tectonic issue of the Tibetan Plateau and its southeastern margins concerns the relationship between the Longmu Co-Shuanghu suture in north-central Tibet and the Changning-Menglian suture in southern Sanjiang

orogenic belt. Whether or not it is possible that these two sutures form a single one along which the main Paleo-tethys had subducted? Accordingly, this project tried to address this issue by tectonic facies analyses in middle segment of the Sanjiang orogenic belt. We conducted detail field studies along six profiles in the regions between Weixi and Liuku Counties, middle segment of the Sanjiang orogenic belt. The total length of the profiles is about 190 km. We collected more than 700 rock samples, of which, 120, 37, 5 were selected for bulk geochemistry (including 44 for Sm/Nd isotopics), LA-ICP-MS zircon U/Pb (9 sandstones for detrital zircons), and $^{40}Ar/^{39}Ar$ dating, respectively. Synthesizing available data, we analyzed the Paleotethyan tectonic facies and their spatial distribution pattern, and/then suggest that the Paleotethyan suture in the middle segment of the Sanjiang orogenic belt is located along the Fugong-Bijiang, sub-parallel to the Nujiang River. East of the suture is the Chongshan-Biluoxueshan metamorphic complex, which mainly consists of metamorphosed Early to Middle Triassic igneous rocks, thus is one part of the Paleotethyan Jamdo-Weixi-Yunxian arc-belt. A Paleozoic passive continental margin is located in the west of the suture; the detrital zircons derived from the Carboniferous quartz sandstone display identical age spectra as its counterpart of the Lhasa terrane. Thus, the tectonic units of both sides of the suture are continuous to their southern and northern counterparts in southern Sanjiang orogenic belt and north-central Tibet, respectively. Other significant achievements of this project include: (1) identification of a magmatic flare-up along the middle segment of the Jamdo-Weixi-Yunxian arc, and/thus indicates highly-variable magmatic evolution along the strike of the arc belt. And (2) we luckily identified an Eocene marine-facies back-arc foreland basin that covers the Paleotethyan rocks and has been broken by Cenozoic tectonic events. Our new data and associated interpretations provide some key lights to improve understanding tectonic evolution of Tibetan Plateau.

Study on the lower age of the Chang'an glaciation and the biostratigraphy of the Cryogenian Period in South China (chief researcher: YIN Chongyu)

By serial volcanic tuff zircon dating research, the SHRIMP zircon U-Pb age of 758.6±5.4 Ma was obtained from the bottom of Chang'an Formation at Tieshanxiang section at western Hunan. The zircon age of 743.8±4.1 Ma was obtained at 10 meters from the lower boundary of Chang'an Formation in the Shibao-Yuanjia section. The zircon U-Pb age of 799.8±5.5 Ma was obtained from the bottom of the Gongdong Formation at Sanjiang area in the border of Guizhou and Guangxi Province. The zircon U-Pb age of 770±10 Ma was obtained from the bottom of Chang'an Formation at Guanghanzhai village near the junction of Jiangxi and Hunan Province. Based on the current isotopic age information and chemical Stratigraphy date, the Nanhuan System is determined for 780 Ma and subdivided into the Lower, Middle and Upper Series. The time limit of the Lower Series is 780~725 Ma, the Middle Series is 725~660 Ma and the Upper Series is 660~635 Ma. They respectively correspond to the global Neoproterozoic Kaigas glaciation (≈ 770~735Ma), Sturtian glaciations (≈ 715~680Ma), Marinoan glaciation (≈ 660~635Ma).

The deep structures and physical properties of the Eastern Tarim basin (chief researcher: YU Changqing)

This topic passes through four years time, has completed the topic design task and had achieved the topic anticipated target and yields the following result and knew: 1st, east Tarim basin because great thick surfaces the boat the stratum cover and the complex surface condition, should pay attention to the static correction question and the speed analysis question specially in the seismic data processing process, this to obtains the good reliable seismic material to be extremely important; 2nd, the full Jar depression is not a complete deposition depression, but was come from depth portion igneous rock cutting to divide into four parts, north in which nearness tower the area along has held the fruit to force the sub-area nature change and contains the oil gas to be exceptionally richest, was east the tower

the local important oil gas unusual area. In addition, approaches the Kongque River pitch belt the sub-area also to have the very big oil gas potential. 3rd, the research discovery, the full Jar depression deposition basis is folds gathers above the older ancient deposition basis, the full Jar's hydrocarbon source possibly also is comes from a more ancient stratum. 4th, through to the tower east the local depth portion nature and the lothological change research, then promotes to the entire Tarim basin, the related result does not support the Tarim basin is "the big igneous rock province" viewpoint. The research indicated that the igneous rocks were found in partial place in the Tarim basin, a " melt rock pillar" from the mantle existed possibly in lower part the basin. 5th, the research results the oil gas survey obtain the good effect east Talimu with in the Tarim basin sylvite resources reconnaissance, 13 papers has been published and 5 graduate students.has been trained.

The metamorphism and tectonic evolution of the eastern segment of the Himalayan orogen (chief researcher: ZHANG Zeming)

The Himalayan range is one of the best documented continent-collisional belts, experienced the Cenozoic collisional orogeny derived from the collision between the Asian and Indian continents, and also records the Mesozoic Andean-orogeny derived from the subduction of the Neo-Tethys. Multistage and different types of metamorphism are well preserved in the different tectonic units of this orogen, forming a natural laboratory for studying metamorphism, magmatism and geodynamic of mountain belts. The present project conducts a study of petrology, mineral geochemistry, geochronology and phase equilibrium for various metamorphic rocks from major tectonic units of the eastern segment of Himalayan orogen, and obtained important achievements. The major progresses include as follow: (1) revealing that the Indian plate colliding with Asian plate occurred at ca. 50 Ma, and then the Indian continent shallowly subducted underneath the Asian continent; (2) reconstructing metamorphic P-T-t path of the Greater Himalayan Crystallines, indicating the orogenic core underwent a prolonged high-temperature metamorphic and anatectic process over ~40 Myr; (3) revealing the tectonic discontinuities within the Greater Himalayan Crystallines, and complex crustal architecture of the Himalayan orogen; (4) revealing that the Himalayan-age granites were derived from dehydration-melting of the subducted Indian continent, and the generated melt mixing and subsequent fractionated crystallization resulted in the granites having complex chemical compositions; (5) revealing that the Neoproterozoic magmatic rocks occur in the east Himalayan orogen; (6) revealing that the middle to lower crust of the Gangdese magmatic arc consists of metamorphosed Mesozoic to Cenozoic magmatic rocks and coeval sedimentary rocks, and the loading of mantle-derived magmatic rocks resulted in the crustal growth and thickening, high-temperature metamorphism and partial melting of the magmatic arc root during the early Cenozoic; (7) The lower crust of the Gangdese arc consists mainly of Late Cretaceous meta-gabbros, which underwent the syn-intrusion granulite-facies metamorphism and associated partial melting; (8) revealing that the Gangdese magmatic arc experienced the Oligocene reworking, characterized by coeval high temperature metamorphism, anatexis and magmatism; (9) revealing the Lhasa terrane experienced the late Paleoproterozoic magmatism with last three phases of metamorphic overprints; (10) reconstructed the metamorphic, magmatic and tectonic history of the Lhasa terrane from the Neoproterozoic to Cenozoic times. These innovative results, published as 21 papers in some high ranking international journals, provide new and important constraints on the formation and evolutionary history of the Tibetan Plateau, especially the collisional orogeny and dynamics.

The crust and upper mantle 3-D seismic velocity structure and dynamics beneath Tongbai Orogen and adjacent areas (chief researcher: ZHENG Hongwei)

This project disposed 45 temporary Broad-Band stations forming a crossed profile in Tongbai orogen and adjacent

areas, which traversed Tongbai orogen from north to south and bestride HP and UHP exhumation zone from east to west. We determined a detailed three-dimensional P-wave velocity (Vp) structure of the crust and upper mantle down to 400 km depth beneath Tongbai orogen and its adjacent by applying tomographic method of Tomo3D tomography program developed by Prof. Dapeng Zhao to 39,384 high-quality teleseismic P-wave arrival times. The data were collected very carefully from the original seismograms of 1643 teleseismic events recorded by 45 temporary Broad-Band stations, supplying 54 fixed Broad-Band staions recorded waveform data by China National Digital Seismograph Network deployed in Tongbai orogen. At the same time, local and regional earthquakes recorded by 54 seismic stations during a period of 2001-2007 are used in this study.our data set contains 4584 P-wave arrival times from 535 local and regional events. The High-Vp anomalies under the Dabie Orogen deeper to 100 km depth and the Low-Vp anomalies under the Tongbai Orogen up to 25 km depth were shown in our local seismic and teleseismic tomographic images. We consider that the absence of UHP rocks in the Tongbai HP metamorphic terrane might be resulted from the deeper burial depth towards the west. Our images show that the high-Vp North China plate subducts toward the south at the longitude of 117°E and break-off down to 100 km depth and even more. The northward subducted Yangzi Plate is not shown in the profile of North-South. Our tomographic results show that prominent low P-wave velocity anomalies under the Hefei Basion and in the middle and lower reaches of Yangtze River metallogenetic belt.

Metamorphic evolution and genesis of paleoproterozoic khondalite series in Liaoning and Jilin region (chief researcher: ZHOU Xiwen)

Based on the detailed field work, metamorphic rock series from the Ji'an and Guanghua Groups in the southern part, and Wuhe Group in the northern part of the Jiao-Liao-Ji belt in the North China Craton, were investigated carefully on petrology and geochronology. For the first time, ultra-high temperature granulite with typical mineral assemblage of hypersthene+cordierite+perthite+spinel+quartz were discovered in the Ji'an Group in the Tonghua region of Jilin province. The peak metamorphic temperature was calculated at least 900°C. the PT path is characterized as clockwise type, which is consistent with a thermal orogenic process. According to zircon U-Pb and Hf isotope analysis results, the depositing age was determined after 1.95 Ga for the Ji'an Group. And also two stages of metamorphic age of 1.95~1.90Ga and 1.90~1.85Ga, which is interpreted as peak and cooling period, respectively. The Guanghua Group is regarded as archean metamorphic supracrustal rocks, whose detrital zircon ages are above 2.5Ga. At the same time, some zircons from metamorphic rocks record 3 stages metamorphic age(2525±10 Ma、1926±40 Ma and 1878±16 Ma), indicating that the Guanghua Group experienced both neoarchean and paleoproterozoic thermo-tectonic events. Zircons from the potassium granite intruding into the bottom of the Guanghua Group yield a concordant mean age of 2154±7 Ma, which is interpreted as intruding time of the ploton. Most TTG gneisses are formed in neoarchean in the Tonghua region, whose zircon Hf model ages concentrate in 2.7-2.8Ga, εHf (t) values are all positive, indicateing from remelting of new continental crust. The Lower part of the Wuhe Group (Xigudui formation) yields depositing age above 2.7 Ga, while the Middle and upper parts yield depositing age no more than 2.1 Ga, indicating that the former belongs to archean and the latter belongs to paleoproterozoic.

5.5 Results of completed National Key Basic Research and Development Projects

A case study on iron isotope geochemistry of continental volcanic-hosted iron deposit (Project Leader: WANG Yue)

The project mainly focused on studying the iron isotope geochemistry of continental volcanic-hosted iron deposits in China (Washan, Taocun, Gushan and Nihe iron ore depoists), in the aim to give an example for applying iron isotopes to trace metallogenetic process. The main innovations of this project are as follows:

(1) For the first time we investigated iron isotope compositions of typical continental volcanic-hosted iron deposits, including Washan, Taocun, Gushan and Nihe iron ore depoists. The data expend our knowledge on iron isotope characters of different types of iron ore deposits.

(2) Iron isotope behavior during magmtic immiscibility was studied, which shows that Fe-rich melts are isotopically heavier than the corresponding silicate melts.

(3) The metallogenetic process of continental volcanic-hosted iron deposits was constrained using Fe isotope geochemistry. Spatial and temporal variations in δ57Fe values within single mineral phases are observed, suggesting iron isotopic fractionation occurs between mineral and fluid phases as a result of precipitation of Fe-bearing minerals during fluid evolution.

(4) The metal source of continental volcanic-hosted iron deposits was constrained using Fe isotope geochemistry.

(5) The metallogenic model of continental volcanic-hosted iron deposits was improved in this research.

New models of TOF-SIMS (Time of Flight Secondary Ion Mass Spectrometer) for Isotope Geology (Project Leader: LIU Dunyi)

During the execution of the project, 2 TOF-SIMS (TOF-SIMS-SI and TOF-SIMS-REE), which are applied in stable isotope analysis and rare earth element analysis, respectively, 8 new devices and 20 key components were developed by the project team; 3 R&D bases were establised; 49 patents for invention were applied and 25 of them have been licensed; 11 utility model patents have been licensed; 8 software copyrights were registered and 56 journal papers were published.

TOF-SIMS developed in the project is the first large secondary ion mass spectrometer independently developed in China, and its main technical specifications are at the advanced level in the industry. The successful development of the instrument will provide a new tool for the study of geochemistry and cosmochemistry, and specifically, the instrument will also play an important role in the studies of petrogenesis, metallogenesis, earth environment and climate change related to human living conditions and resources, the material composition of the moon and planets, etc.

Superpostion of the Mongol-Okhotsk plate tectonic regime on the Paleo-Asian oceanic plate and its metallogenic systems (Project Leader: WANG Tao)

The dynamic system and metallogenic background of NE China and Northeast Asia are hot debate topics and have long puzzled geologists, someone thought them related with the subduction of Paleo-Pacific Ocean. But Russian geologists argue the Mongolia-Okhotsk Ocean as important reason from the 1990s. After that, more and more researcher pay attention on this belt. However, many questions are still not clear and seriously concerned by international geoscientists, such as when and how did this orogenic belt start subduction, ocean close, and collide? How wide did the effect of this orogen? especially on China. Is there any independent metallogenic system? How to distinguish the metallogenic system of this belt from the Paleo-Pacific system? The following achievements have been obtained through study at key areas, set database, digital mapping, and Big Data analysis: (1) Identified Permian arc-like magmatic belt in the central Mongolia, western end of Mongolia-Okhotsk Belt. And, this arc-like magmatic belt alteration and migration to the east and younger. It intent the subduction and roll-back mechanism as well as the impaction scope of the subduction of the Mongolia-Okhotsk Ocean. At the same time, the migration eastward of the

Triassic-Jurassic magma in the Mongolia-Okhotsk Belt are also confirmed, revealing the zipper-type closure of the ocean toward the east. (2) Based on the study of the evolution characters of the tectonic, magmatism and metallogeny reveal the process from the subduction in late Paleozoic-early Mesozoic, crust thicken resulting from collision orogenesis in the late Mesozoic Jurassic period, and extension, collapse and thinning in the Cretaceous. Importantly, the spatial scopes of the process are defined. It interprets the double dynamic setting for massive planar extension of the crust and metallogenic outburst in Northeast Asian, which are rare in the world. It establish the foundation for the metallogenic system of Mongolia-Okhotsk and its spatial-temporal scope, and provides a classical example for combining the multidisciplinary to interview crust extensional thinning and its metallogenic background. (3) Through database building, mapping and data integration analysis as well as based on the systematic summary of the metallogenic characteristics in the region, the metallogenic system of the Mongolian-Okhotsk oceanic tectonic system is determined, and the subduction-collision-post-collision metallogenic series as well as the metallogenic series which are disintegrated from different systems, are established with their superimposed metallogenesis.

Mechanisms of Neoproterozoic mineralization of Mn, Fe and P in the Yangtze Basin (Project Leader: ZHU Xiangkun)

Through three years of research from 2014 to 2016, all participating organizations completed the designed tasks. The main innovations of this project are as follows:

(1) We proposed a refined dissolution method for rare earth element studies of bulk carbonate rocks. The method for REE studies of bulk carbonate rocks requires an initial dissolution of 30%–40% followed by the sampling dissolution of 30%–40% of total carbonate using 5%v/v acetic acid to produce REE information considered to best represent that of the carbonate source water.

(2) We gained a new SIMS U-Pb zircon age of 654.2±2.7 Ma from the middle Datangpo Formation in Changyang County of Hubei Province, China, which confirms that the Nantuo glaciation started much later than 654 Ma.

(3) We presented Fe isotopes, Fe species and other geochemical data for two sections of the Doushantuo Formation (ca. 635-551 Ma) deposited after the Nantuo glacial episode in the Yangtze Gorge area, South China. Our study suggests that during the deposition of the bottom of Member II of the Doushantuo Formation the shallow seawater was oxic, but the deep water was characterized by ferruginous conditions. The oxidation of Fe (II)aq and DOC-rich anoxic deep seawater upon mixing with oxic shallow water provides an innovative explanation for the well-known negative δ13Ccarb excursions (ENC2) and positive δ56Fe excursions in the middle of Doushantuo Formation.

(4) We presented a high resolution pyrite Fe isotope record for a~120-m-long drill-core (ZK105) through Sturtian glacial diamictites and the overlying interglacial sediments in the Nanhua Basin to explore changes in marine chemistry during the late Cryogenian. Our pyrite Fe isotope profile thus records increased oxygenation in the Nanhua Basin between the Sturtian and Marinoan glaciations. The increased oxygenation of Nanhua Basin seawater deduced from pyrite Fe isotopes could have resulted from either local or global controls. Further work will be needed to determine whether this increasing oxygenation extended to the global scale.

(5) We conducted an integrated study on iron and sulfur isotopes and redox-sensitive elements (Mo, U, and V) of Lower Cambrian phosphorite deposits fromtwo shallow sections (Meishucun and Gezhongwu) and a deeper water section (Zunyi) from the Yangtze Platform, South China. The data suggest redox-stratified oceanic conditions during the Early Cambrian, in which completely oxygenated shallow water (platform) coexisted with anoxic deep water (slope). We propose that prolonged upwelling of dissolved organic carbon (DOC)-, Fe(II)- and phosphorus-rich anoxic deep water in a redox-stratified ocean could have increased exchange with the open ocean, resulting in major phosphorite deposition in oxic-suboxic conditions. The progressive oxygenation of the ocean may have facilitated the

Early Cambrian biotic diversification.

In-situ SHRIMP U-Pb dating of U-bearing accessory minerals (rutile, baddeleyite, and monazite) (Project Leader: SHI Yuruo)

This project aims at developing in-situ SHRIMP U-Pb dating methods of the unconventional but promising U-bearing accessory minerals (xenotime, rutile, baddeleyite and monazite), and all expected goals have been accomplished. Improvements and innovations were made both on mount making and data acquisition for in-situ SHRIMP analyses. The mounts have been made with the microprobe sections and rock fragments at a millimeter level, and U-bearing minerals therein have been marked before analyzing. Specific guilding peak and monitor peak were adopted for certain mineral phase during SHRIMP analysis. Our studies focused mainly on rutile in eclogites from Dabie UHP metamorphic belt, baddeleyite in a monzonite porphyry from Xiaoshan area, and monazite from Chuanlinggou Formation of the Ming Tomb District. And the detailed achievements are presented as follows:

(1)BSE images of the mounts made by crushed eclogite samples indicate that rutiles occur as inclusions in garnet or other minerals, and some rutile grains are distributed interstitially among these minerals (Figure 1a). In-situ SHRIMP U-Pb dating on rutiles of various occurrences showed consistent $^{206}Pb/^{238}U$ ages, of which the weighted mean value is 219±4 Ma (Figure 1b). We interpreted this age as the exhumation time of Dabie UHP metamorphic belt.

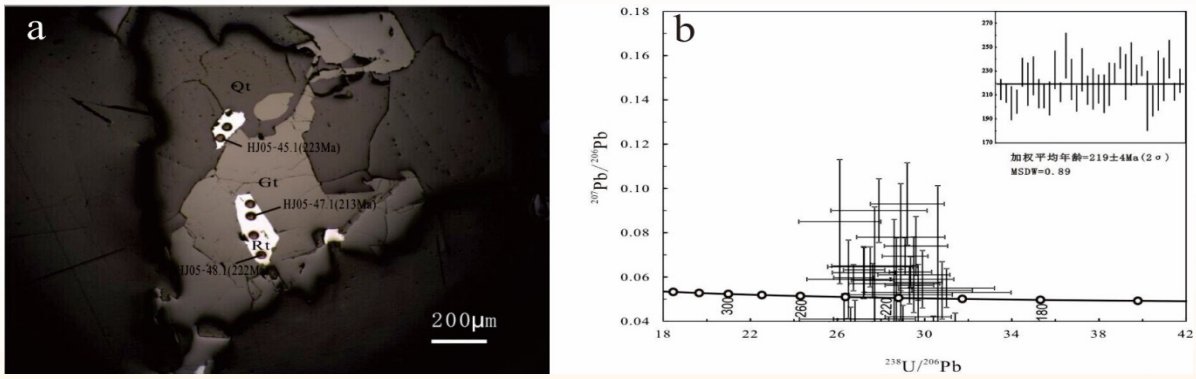


Figure 1 a) BSE image of rutile included in garnet and distributed among different minerals in a Dabieeclogite from Jinheqiao area, Taihu county; b) SHRIMP U-Pb analytical results of rutile

(2) SHRIMP U-Pbdating results of baddeleyite and isolated zircon are 1779±8 Ma and 1777±8 Ma, suggesting an evolution from silica-undersaturated towards silica-saturated status and representing the initial crystallization and final emplacement of the host monzonite porphyry magma. Polycrystalline zircon overgrowths on baddeleyite were formed by reaction of pre-existing baddeleyite with fluids enriched in silicon during certain hydrothermal event. A schema diagram (Figure 2) was propsed as follows:

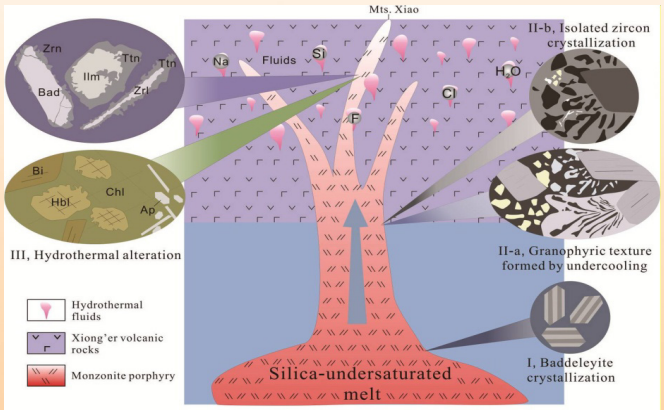


Figure 2 Schema diagram showingmagmatic evolution and formation of baddeleyite and zircon from a monzonite porphyryin Xiaoshan area, western Henan province

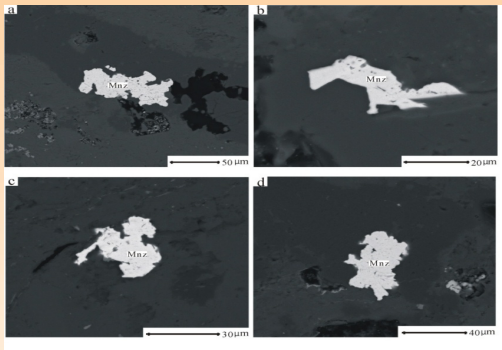


Figure 3 BSE images of irregular-shaped monzonite in silty mudstones from the Chuanlinggou Formation of the Ming Tomb District

(3) BSE images show that monazites have irregular shapes, appearing as fishes, birds, flowers, worms, and so on (Figure3), and are mostly distributed in quartz or hematite veins. SHRIMP U-Pb dating of monazite yields an U-Pb age of 152±11 Ma, representing a post-magmatic hydrothermal event rather than diagenesis.

SHRIMP U-Pb dating studies on these U-bearing accessory mineralsare not only a breakthrough of technological method but also endowed with great geoscientific significance. Existing achievements will also promote further communication and cooperation internationally.

Long-term deep borehole geophysical observation and comprehensive data analysis(Project Leader: PI Jinyun)

The goal of this project was to install multi-level borehole seismometers and thermometers at different depths in the Chinese Continental Scientific Drill (CCSD) main hole (5158 meters deep) which is located approximately 30-km east of the Tancheng segment of Tan-lu fault (TLF). We also planned to drill a shallow hole in the CCSD Observation and Research Base to install a set of comprehensive geophysical instruments. Surrounding the CCSD main hole, 6 broadband seismometers would be deployed under the ground along the Tan-lu fault. The combined observation data achieved from the deep hole, shallow hole and ground geophysical instruments would help us to further study the internal structure and activity of the fault zone. The result of the project would also provide us important data and scientific basis for studying the structure of the lithosphere in the eastern China region and continent dynamics. The main achievements of this project are as follows:

(1)The Donghai geophysical comprehensive borehole observation laboratory

We drilled a hole which was 452.6 meters deep and whose maximum tilt was 1.1 degree in the CCSD Observation and Research Base. Non-magnetic casing pipes were installed from 0 meter to 400 meters in the hole. The segment from 400 meters to 452.6 meter was open hole whose inner diameter was 130 mm. We installed 2 sets of 4-C strain gauge (1 for copy), 2 sets of 3-C magnetometer (1 for copy), 2 sets of pore pressure sensor (1 for copy), 2 sets of geo-thermometer (1 for copy) at the bottom of the hole. All the instruments were solidified by cement. We installed 1 set of 3-C seismometer, 1 set of 2-C inclinometer, 1 set of water thermometer at 415 meters deep, and 1 set of groundwater level meter, 1 set of radon measurement sensor, 1 set of air pressure sensor, air temperature sensor, and rainfall sensor at the wellhead. On the ground, we built the observation laboratory where the power controller, data storage and transmission instruments, communication and network system, the solar cell panel were assembled.

(2) 6 broadband seismometer long-term observation stations along the Tan-lu Fault

We deployed 6 broadband seismometer stations along the Tan-lu Fault for long-term observation purpose. They were located in Rizhao, Feixian in Shandong Province, Sihong, Jinhu in Jiangsu Province, and Hexian, Fengtai in Anhui Province.

(3)Real time data transmission and storage system

We rented a 2M MSTP special line from China Telecom to transmit the geophysical data from the CCSD Observation and Research Base in Donghai to the Institute of Geology in Beijing. We assembled two real-time display systems and two databases, 1 in each side respectively. We could also monitor on-site data collection remotely from Beijing.

On November 28, 2017, researchers Yang Jingsui and Hou Zengqian were elected as academicians of the Chinese Academy of Sciences in the academician election of the Chinese Academy of Sciences in 2017.

Yang Jingsui, Academician

Research fields: Dr. Yang has a PhD in geology from the University of Dalhousie, Canada, and is the Chair of the Petrology Commission, Geological Society of China, and is a member of both the Geological Society of America and the Mineralogical Society of America. He has been engaged in the study of petrology and tectonics for many years, focusing on the Qinghai-Tibet Plateau terrain boundary and orogenic belt, ophiolite chromite, and deep mantle minerals. Under his leadership, the Center for Advanced Research on the Mantle has recently undertaken the International Geoscience Program IGCP-649, which intends to comparatively study the minerals from different ophiolites, chromites, and the deep mantle worldwide. With outstanding research results, he has won a State Natural Science Awards as well as other national, provincial, and ministerial awards.

Hou Zengqian, Academician

Research fields: Dr. Hou has long had a role regional metallogeny, tectono-magmatic mineralization, continental metallogeny, submarine hydrothermal mineralization, and magmatism in orogenic belts. He has undertaken geological research and conducted the Tethys domain correlation study on the Qinghai-Tibet Plateau and in the southwest Sanjiang region. He has systematically demonstrated the metallogenic mechanism of the Qinghai-Tibet Plateau continental collision, making substantial contributions to the development of the metallogenic theory of continental collision. He has established the metallogenic model of collisional porphyry copper ore and developed the metallogenic theory, facilitated the discovery of copper in Gangdise belt; established a new model of the inverse thrust fold system and a new method of lead-zinc metallogenic prospecting, and directed a prospecting breakthrough of a super-large deposit in the lead-zinc mine in Duocaima, Qinghai. He has been awarded the National Science and Technology Progress Award (one special prize and one first prize), and 4 first prizes in ministerial awards. He has edited 4 special issues of international journals, published 4 monographs in Chinese, 170 SCI papers in Geology, EPSL, Scientific, Reports, Economic, Geology and other journals, and has been cited 5,008 times by SCI. He has been elected Vice President of the Society for Geology Applied to Mineral Deposits and is a member of the Society of Economic Geologists (SGE). He was the first Chinese scholar selected as an SEG Regional Vice President Lecturer.

On September 9, 2017, researcher Liu Fulai won the 15th Li Siguang Geological Science Awards-Scientific Research

Liu Fulai, Research Fellow

Research fields: Dr. Liu's research focuses on the formation and evolution of cratons and orogenic belts, and the metamorphism and deep melting of early Precambrian high-grade metamorphic rocks. He was awarded the National Science Fund for Distinguished Young Scholars Award and is Head of the Metamorphic and Precambrian Research

Division of the Institute of Geology. He has led and participated in more than 30 research projects at the national and provincial levels, and has won many awards at the national, provincial, and ministerial levels. He was elected a member of the Geological Society of America, a Leading Talent of the Ministry of Land and Resources, and an Outstanding Geological Talent of the China Geological Survey, and the National Talents Project, among others. He has published more than 230 papers in key academic journals at home and abroad, among which more than 140 were SCI papers. His studies have been cited by SCI more than 4,500 times and he has published seven co-authored monographs.

Researcher Liu Yongqing won the Excellent Geological Talent Award of China Geological Survey

Liu Yongqing, Research Fellow

Research fields: Dr. Liu has long been engaged in and has made substantial contributions to research in sedimentary geology, regional geology, petroleum geology, stratigraphy, chronostratigraphy (especially the distribution and evolution of the terrestrial biota of the late Mesozoic in North China), continental volcanic–sedimentary stratigraphy and chronostratigraphy, volcanic magmatism, tectonic and sedimentary geology (including basin evolution), infilling development, sedimentary paleogeography, and environmental research. In 2005–2007, he won one first prize and two second prizes in the Scientific and Technological Progress Awards of the Ministry of Land and Resources of China. Since 2000, he has co-edited three monographs and published more than 30 papers.

Researcher Liu Chaohui won the 2017 Excellent Geological Talent Award of China Geological Survey and the 16th Youth Geological Science and Technology - Silver Hammer Award of Geological Society of China

Liu Chaohui, Research fellow

Research fields: Dr. Liu is mainly engaged in the study of the formation and evolution of early Precambrian geological bodies. His research focuses on the formation age, provenance, and tectonic background of the Proterozoic supracrustal rocks of the central orogenic belt in the North China Craton; the relationship between the provenance of the supracrustal rocks of the rift belt in the Middle Proterozoic in the North China Craton and the breakup of the Columbia supercontinent; and other key scientific problems. He was elected as an Excellent Youth of the China National Science Foundation.

Zhu Zhiyong, Associate Researcher, is selected as a Youth Talent of Huangjiqing 2017

The outcomes, “Formation and Evolution of Early Cambrian Crust of North China Craton”, a project led by Wan Yusheng (a researcher), won the first prize of 2017 Science and Technology Award of Ministry of Land and Resources

The project team has achieved significant innovative outcomes in researches, including the oldest terrane of North China, evolution law of early crust, banded iron ore (BIF), greatly enhanced our international status at the Early Precambrian, especially in the field of formation and evolution study of early earth crust The outcomes, “Study of the Dinosaur Fossil Group”, a project led by Lv Changjun (a researcher), won the second prize of 2017 Science and Technology Award of Ministry of Land and Resources.


国土资源科学技术奖

获奖证书

获奖项目：华北克拉通早前寒武纪地壳形成和演化

获奖等级：一等

获 奖 者：中国地质科学院地质研究所

二〇一七年十月

证书号：KJ2017-1-09-D1


国土资源科学技术奖

获奖证书

获奖项目：华北克拉通早前寒武纪地壳形成和演化

获奖等级：一等

获 奖 者：万渝生

二〇一七年十月

证书号：KJ2017-1-09-R1

The project team found Ruyang giant sauropod dinosaur fauna and Luanchuan fauna through the study, established a new dinosaur taxon, namely Henan 21st species, 21st genus, 15th family, found and named pterosaur fossils in western Liaoning, and especially found darwinopterus and female darwinopterus that is co-reserved with eggs of transition period, which generates great international response and fills the gap of pterosaur type from origin to progressive evolution


国土资源科学技术奖

获奖证书

获奖项目：河南豫西地区恐龙化石群研究

获奖等级：二等

获 奖 者：中国地质科学院地质研究所

二〇一七年十月

证书号：KJ2017-2-01-D1


国土资源科学技术奖

获奖证书

获奖项目：河南豫西地区恐龙化石群研究

获奖等级：二等

获 奖 者：吕君昌

二〇一七年十月

证书号：KJ2017-2-01-R1

7.1 Projects funded by the National Natural Science Foundation of China (NSFC)

At present, there are 125 funds in execution. What are included are 1 Fund for Distinguished Young Scholars, 2 Funds for Excellent Young Scholars, 3 progects for International (regional) Cooperation and Exchanges, 1 Joint Funds, 11 Key Fund Projects, 1 Emergency Management Fund, 62 General Programs and 43 Funds for Young Scholars.

There were 92 items applied in Natural Science Foundation of China in 2017, and 36 items that were funded. What were included are 21 General Programs, 10 Funds for Young Scholars, 3 progects for International (regional) Cooperation and Exchanges, and 2 projects for Major Research Programs for Tethys Geodynamic system, with the funding rate of 39% achieveing a historical breakthrough.

Fund projects newly funded and re-performed are shown in bold red and black texts respectively (red on the top and blue at the bottom).

National Science Foundation for Distinguished Young Scholars			
No.	**Chief Investigator**	**Project**	**Duration**
1	ZENG Lingsen	Crustal Anatexis and Deep Orogenic Processes	2015-2019
National Science Foundation for Excellent Young Scholars			
No.	**Chief Investigator**	**Project**	**Duration**
1	LIU Chaohui	Precambrian Geology	2017-2019
2	ZHAI Qingguo	Tectonics of the Tibetan plateau	2016-2018
International (regional) Cooperation and Exchange of the NSFC			
No.	**Chief Investigator**	**Project**	**Duration**
1	YU Changqing	Dense profile probing depth extent of Pengguan Complex and Longmenshan Fault	2018-2020
2	HE Rizheng	Unraveling the Dynamic Processes beneath the Northern Tibetan Plateau: Paleozoic Collision and Convergence and Cenozoic Destruction and Uplift	2018-2020
3	YANG Jingsui	Diamond in Oceanic Peridotites -Chromitites and Deep Recycled Mantle in the Global Ophiolite Record	2018-2022
4	YIN Jiyuan	Tectonics and geodynamics of the Altai-Junggar intracontinental orogen in the Vendian-Paleozoic	2017-2018
5	LI Haibin	Fault Friction over Time: Coseismic Weakening and Postseismic Healing in situ	2016-2020
6	HOU Zengqian	Comparison of the main metallogenesis of the Himalayan-Zagros collisional orogenic system	2014-2018

Emergency management of the NSFC			
No.	**Chief Investigator**	**Project**	**Duration**
1	YANG Jingsui	Diamond in Cuba Oceanic Peridotites Chromitites and Deep Recycled Mantle Record	2017.1-2017.12

Major Research Programs for Tethys Geodynamic system			
No.	**Chief Investigator**	**Project**	**Duration**
1	QI Xuexiang	Mesozoic melange belt in the southeastern Gaoligong orogen, west Yunnan, and its relationship with the southern extension of the Banggonghu-Nujiang suture	2018-2020
2	ZHAI Qingguo	Tectonomagmatism associated with the opening of the Paleo-Tethys Ocean: Key study on the central Qiangtang northern Tibet	2018-2020

Major Research Plan			
No.	**Chief Investigator**	**Project**	**Duration**
1	GAO Rui	The high resolutuion deep seismic probe and research for the lithospheric structure and deformation in the northeastern Tibetan	2016-2020

Joint Funds of the NFSC			
No.	**Chief Investigator**	**Project**	**Duration**
1	WANG Tao	Spatial-temporal distribution of deep, old and juvenile continental crust and constraints on metallogenesis of northern Xinjiang and adjacent areas	2015-2018

Key Projects			
No.	**Chief Investigator**	**Project**	**Duration**
1	JIN Xiaochi	Permo-Triassic paleogeography of eastern Tethys: paleontological, sedimentological and paleomagnetic evidence from western Yunnan and	2017-2021
2	ZHANG Jianxin	Linking metmorphism with orogensis: insight from early Paleozoic orogenic system in the northeastern Tibet	2017-2021
3	LI Haibing	Fault friction over time: Co-seismic weakening and post-seismic in-situ healing	2016-2020
4	GAO Rui	The high resolution deep seismic probe and research for the lithospheric structure and deformation in the northeastern Tibetan Plateau	2016-2020
5	ZHU Xiangkun	A high-resolution study on Cryogenian interglacial oceanography: a record from the Yangtze basin	2015-2019
6	LIU Fulai	The spatial extension, multiple metamorphism and magmatism, and tectonic evolution of the Jiao-Liao-Ji orogenic belt, North China Craton	2015-2019
7	XU Zhiqin	Hot collisional orogenic dynamics: deformation, metamorphism and partial melting during exhumation process of the Great Himalaya complex (Central Nepal)	2015-2019

8	GAO Rui	Detailed structure of the lithosphere and deep processes of deformation in the transition from the northeastern Tibetan Plateau to the Alashan, Ordos and Sichuan Craton basins	2015-2019
9	HOU Zengqian	Comparison of the main metallogenesis of the Himalayan-Zagros collisional orogenic system	2014-2018
10	LI Haibing	Fault friction over time: co-seismic weakening and post-seismic healing within the Wenchuan Fault	2014-2018
11	ZHANG Zeming	Metamorphism and tectonics of the eastern Himalayan orogen	2013-2017

General Projects

No.	Chief Investigator	Project	Duration
1	LIU Yan	Contribution of metasomatism in carbonatited mantle and dissolution of fluids from carbonatitic melts to the formation of giant Maoniuping REE deposit in Sichuan, China	2018-2021
2	HE Zhenyu	Xingxingxia area, Eastern Xinjiang, NW China: Petrogenesis and their implications for the composition of the ancient crust	2018-2021
3	ZHANG Hongrui	Cenozoic deformation and related Pb-Zn-Cu mineralization in the Lanping basin	2018-2021
4	JIA Jianliang	Efficiency and mechanism of organic carbon burial in Cretaceous lacustrine fine-grained sediments: Insights from mineral surface protection in an anoxic environment	2018-2021
5	SU Dechen	Meso - Neoproterozoic seismic records and multi-stage rifting in the North China Craton	2018-2021
6	DU Lilin	Implication of 2.7Ga and 2.1-2.0 Ga magmatic events in Fuping Complex, central of the North China Craton	2018-2021
7	WANG Fang	Multiple metamorphism and geochronology of metamorphic complex in southwestern margin of Yangtze Block	2018-2021
8	WANG Wei	The Neoarchean anatexis of the eastern North China Craton and its geological significance	2018-2021
9	LIU Jianhui	The nature of the polyphase magmatic events and metamorphic volcanic-sedimentary successions in the Kuandian area: Constraint on the tectonic setting of the Paleoproterzoic Jiao- LiaoJi Tectonic belt	2018-2021
10	LI Huaqi	Basu metamorphic complex, eastern central Tibet: implications for early Jurassic arc-continental collision along middle-eastern Bangong-Nujiang suture	2018-2021
11	LI Yuan	Study on the deformation-metamorphism sequences of the Xigaze ophiolite in South Tibet, China: Implication for the evolution of the Neo-Tethyan ocean	2018-2021
12	LI Shan	Petrogenesis of Triassic granitoids in Sumatra, Indonesia constraint on continental crust formation and evolution of the southern Paleo-Tethys	2018-2021
13	WANG Tao	Rock assemblages and accretionary orogenic processes of the Lajishan mélange in the Central Qilian belt	2018-2021
14	SUN Jian	The recycling of marine sediments and rare-earth-element mineralization: a multiple-isotope study	2018-2021

15	FENG Guangying	Petrogenesis and geological significance of the early-Mesozoic mafic intrusions in the Lesser Xing'an Range-Zhangguangcai Range	2018-2021
16	LIU Yingchao	The metallogenesis of quartz-rich carbonatehosted Pb-Zn deposits in the thrust-fold belt: A case study of the Malayer-Esfahan Pb-Zn metallogenic belt in Iran	2018-2021
17	SONG Yucai	Giant accumulations of barite and metals in the world-class Mehdiabad Pb-Zn deposit, Iran	2018-2021
18	CHEN Wen	Study on Titanite (U-Th)/He Dating Technique	2018-2021
19	WANG Yanbin	Crustal evolutuion of high grade metamorphic Block from the Bolingen Islands, Antarctica:Constraints from geochemistry and zircon U-Pb, Hf-O isotopes.	2018-2021
20	ZHANG Hongshuang	The study on lithospheic geometry and extensional mechanism in southeastern China-Receiver function analysis of dense broadband seismic array	2018-2021
21	XIONG Xiaosong	The detailed crustal structure of the North Qilian-Southern margin of Alxa block, and the constraints of the Paleozoic framework to the Cenozoic northward-propagation of the Tibet	2018-2021
22	MENG Fancong	Genetic mineralogy of garnet peridotite-eclogite from the Polar Urals, Russia	2017-2020
23	Chevalier Marie-Luce	Tectonic activity along the Xianshuihe fault zone and deformation model constraint of the eastern Tibetan Plateau	2017-2020
24	KUANG Yongsheng	Source characteristics of volcanic rocks in Xiaoling and Laohutai Formation, Eastern Liaoning: Constrained by melt inclusions and olivines	2017-2020
25	LIU Pinghua	Multiple metamorphic events of the eastern Alxa-Langshan Precambrian metamorphic complex, western Inner Mongolia	2017-2020
26	LIU Yongqing	The Late Jurassic eolian depositional associations in North China, and its implications of palaeoclimate and palaeogeography	2017-2020
27	LV Junchang	Study of the Ganzhou Dinosaurian Fauna from Ganzhou district, Jiangxi Province	2017-2020
28	NIU Xiaolu	Origin and geological significance of the Indosinian alkaline rocks on the western part of the northern margin of North China Craton, Inner Mongoliz	2017-2020
29	XU Xiangzhen	Detailed FIB and TEM studies from the different types of mantle peridotite	2017-2020
30	YAN Zhen	Study on tectonic evolution of the early Paleozoic Lajishan trench-arc system	2017-2020
31	YI Zhiyu	Record of rapid apparent polar wander in East Asia and its significance	2017-2020
32	LIU Pengju	Ediacaran silicified microfossils from the Hunan and Guizhou Provinces and their biostratigraphic correlation	2016-2019
33	TANG Feng	Macrofossil biotas in the late Ediacaran–Cambrian boundary interval of South China and biostratigraphic correlation	2016-2019
34	ZHANG Cong	Tracing the ancient subcontinental lithospheric mantle----Example from garnet peridotite of the Lvliangshan terrane, North Qaidam UHP metamorphic belt	2016-2019
35	YU Shengyao	Anatexis, deformation and exhumation of UHP metamorphic rocks: a case study of the South Altun-North Qaidam UHP metamorphic belt	2016-2019

36	MENG En	Petrogenesis of the Paleoproterozoic metamorphic supracrustal sequence and meta-mafic intrusions in Liaoning and Jilin Provinces: constraints on the regional tectonic evolution	2016-2019
37	YANG Chonghui	Magmatic activity in the (2.4-2.3 Ga) global magmatic quiescence: A case study of the North China Craton	2016-2019
38	ZHANG Jianxin	Metamorphic and deformational history of fossil subduction channels--examples from the North Qilian and North Altun	2016-2019
39	ZHANG Jin	Study on the kinematics, stages and tectonic backgrounds of the main fault systems in and around the Alxa Block	2016-2019
40	SI Jialiang	Fluid-rock interaction during healing of the Longmenshan fault zone	2016-2019
41	ZHAO Lei	Nature of the Daheishan mafic- ultramafic complex from the Yiwu area, East Junggar, and comparative study on ophiolites in the East and West Junggar	2016-2019
42	YIN Jiyuan	Thermochronologic constraints on exhumation processes in the West Junggar metallogenic belt	2016-2019
43	ZHANG Yan	The study of Ar-Ar dating on ultrafine minerals	2016-2019
44	HE Rizheng	Eastward tracing LongmuCo-Shuanghu suture zone and its tectonic significance	2016-2019
45	LU Zhanwu	Study of “bright spots” structures in deep seismic reflection profiles in central and western Tibet	2016-2019
46	LI Qiusheng	The deep process and geodynamics of Mesozoic tectonic transition in the intersection area of rhe Nanling Range-Wuyi Mountain, southeastern China — applying a high dense array of broadband seismic observations	2016-2019
47	XIONG Xiaosong	Detailed structure of the lithosphere and numerical modeling of crustal growth in the middle region in the Great Xing'an Range	2016-2019
48	WANG Haiyan	Lithosphere structure and development of the Qinling orogenic belt	2016-2019
49	TIAN Shugang	Late Permian organic reefs and palaeogeographic conditions in the Linxi, area, Inner Mongolia - Jiutai, Jilin	2015-2018
50	YAO Jianxin	High-precision stratigraphic correlation between South China and Tibet during the major turning period of the Permian-Triassic biotic evolution	2015-2018
51	LIU Jianfeng	Petrogenesis and geological significance of early-middle Triassic mafic volcanic rocks from southeastern Inner Mongolia	2015-2018
52	ZHANG Zeming	Formation and evolution of the Precambrian crystalline basement of southeastern Tibet	2015-2018
53	WU Cailai	Magmatic system dynamics in Shujiadian, Tongling	2015-2018
54	ZHANG Hongrui	Coupling between deformation and fluid flow in the Baiyangping ore-producing hydrothermal system, Sanjiang area	2015-2018
55	KUANG Hongwei	Formation mechanism and correlation of molar tooth carbonate—the sedimentary record in the Meso-Neoproterozoic	2015-2018
56	DONG Chunyan	Late Neoarchean to early Paleoprotero- zoic tectono-magmatic-thermal events in the Daqingshan area: Geology, geochemistry and zircon geochronology	2015-2018

57	XIE Hangqiang	Tectono-thermal events and tectonic setting during the late Neoarchean in western Shandong	2015-2018
58	WAN Yusheng	Formation and evolution of the Archean basement in eastern Hebei: Geology, geochemistry and SHRIMP U-Pb zircon dating	2015-2018
59	REN Liudong	Distribution of Pan-African orogenic belts in the East Antarctic Craton and geological features of the Prydz belt	2015-2018
60	LU Haijian	Tectonic coupling between the Kumukuli basin and adjacent orogenic belts: evidence from paleomagnetism and low-temperature thermochronometry	2015-2018
61	CAO Hui	P-T-t-D path based on quantitative data of porphyroblast growth: a case study of Qilian Tuolemuchang	2015-2018
62	TANG Suohan	Precise determination of Ti isotope com- position in rock samples and geological application in mantle processes	2015-2018
63	YANG Zhiming	Genesis of comb quartz layers: case studies from porphyry Cu deposits at Qulong, Tibet and Now Chun, Iran	2015-2018
64	CHEN Wen	Isotope thermochronological research on orogenic and ore-forming processes in the eastern part of the western Tianshan orogenic belt	2015-2018
65	HOU Hesheng	Tectonophysics research and its significance for the Suihua-Hulin profile, northeast China	2015-2018
66	DONG Jin	Paleo-secular variations and environ- mental magnetic study on Holocene lake sediments from the monsoon marginal zone in eastern China	2014-2017
67	GUO Lei	Spatial distribution, transition mechanism and timing of late Mesozoic crustal contraction and extension on the southeastern China-Mongolia border	2014-2017
68	GUO Xianpu	Study on Middle-Late Ordovician vertebrate fauna in Bachu County, South Xinjiang	2014-2017
69	JI Shu'an	Early Cretaceous vertebrate fauna from the Ordos Basin (Inner Mongolia) and related stratigraphic correlation	2014-2017
70	LI Yibing	Petrological and geochronological studies on variable magmatic evolution during the early stages of the Izu-Bonin-Mariana Island-arc	2014-2017
71	LI Zhaoli	Determination of the Songduo suture zone in the Lahsa terrain and Indosinian orogeny of the Qinghai-Tibet Plateau	2014-2017
72	LIU Chaohui	Tectonic features of the Zhaertai and Bayan Obo Groups at the northern margin of the North China Craton and their relationship with break-up of the Columbia supercontinent	2014-2017
73	LIU Fulai	Multiple metamorphic and partial melting events in the San Jiang complex belt, southeastern Tibetan Plateau	2014-2017
74	LIU Yongqing	The Tuchengzi-Zhangjiakou Formations and basin evolution at the transition of the Jurassic-Cretaceous in the Yanshan Mts. and implications for the North China rift system	2014-2017
75	TONG Ying	Petrogenesis of Permian A-type granites in the middle segment of the border between Mongolia and China and tectonic implications	2014-2017
76	WANG Yanbin	Crust formation and evolution of the Archaean Block from the Rauer Group, Antarctica: constraints from geochemistry and zircon U-Pb, Hf-O isotopes	2014-2017
77	XU Jiren	Analyses of seismic data recorded at different depths of the Donghai 5000 m borehole and study of the non-linear properties of seismic waves in different layers and the seismo-tectonics in and around the Tanlu fault	2014-2017

78	YAN Zhen	Sedimentary analysis of the wedge-top basin within the ophiolite mélange belt in the Lajishan Mountains	2014-2017
79	YANG Tiannan	Dose the Longmu Co-Shuanghu suture connect with the Changning-Menglian suture?	2014-2017
80	YIN Chongyu	Study on the lower age of the Chang'an glaciation and the biostratigraphy of the Cryogenian Period in South China	2014-2017
81	YU Changqing	The deep structure and physical properties of the Eastern Tarim basin	2014-2017
82	ZHENG Hongwei	The crust and upper mantle 3-D seismic velocity structure and dynamics beneath the Tongbai Orogen and adjacent areas	2014-2017
83	ZHOU Xiwen	Metamorphic evolution and genesis of the Paleoproterozoic khondalite series in the Liaoning and Jilin regions	2014-2017

Funds for Young Scholars

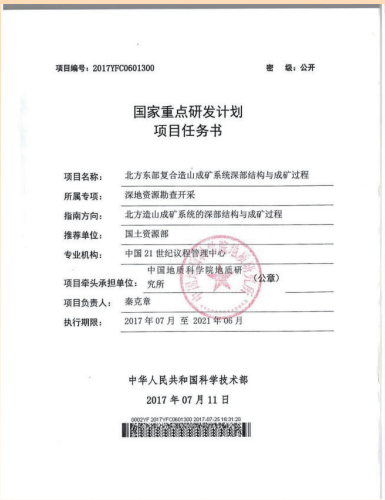
No.	Chief Investigator	Project	Duration
1	BO Jingfang	Research on Middle Triassic scleractinian coral fauna from the Poduan Formation in southwestern Guizhou	2018-2020
2	YANG Qidi	The source characteristics of Early Paleozoic granitoids from Dongwuqi area，Centreal Inner Mongolia：Implications for crustal	2018-2020
3	WEI Yi	Palaeoelevation evolution of Tibetan Plateau hinterland during the Eocene Oligocene：Evidences from ostracods and isotope	2018-2020
4	SHEN Weibin	The study on the geochemical characteristics of pyrite in Nantuo Formation in the Nanhua period, Yangtze Block, South China	2018-2020
5	QU Huanchun	The discovery of sulfide inclusions in the quartz of the UST in Qulong porphyry Cu deposit, Tibet: Constraints on the genesis of ore deposits	2018-2020
6	QIU Tian	The characteristics of ore-forming fluid and constraints on genesis of listwaenite-related gold deposit in Sartohay, Xinjiang	2018-2020
7	CHENG Ting	High precision U-Pb isochron dating of carbonate minerals	2018-2020
8	LI Hongqiang	Research on Lower Crustal Fabrics and Moho Variations of Yarlung Zangbo Suture Zone and Its Both Sides by Large Dynamite Shots	2018-2020
9	YE Zhuo	A research on the deep structure beneath the tectonic boundary zone between NE Tibet and the Alxa block	2018-2020
10	HAN Jianguang	The research on mutiwave Gaussian beam migration for TTI media under complex surface condition	2018-2020
11	CHAI Peng	Tracking oxygen fugacity of multiphase magmatic processes and study on petrogenesis of Ermi reduced porphyry copper deposit	2017-2019
12	DING Huixia	Metamorphic evolution of the Higher Himalayan Crystalline Sequence in Cuona region, south Tibet	2017-2019
13	LONG Tao	High spatial resolution simultaneous dating and determination of trace elements in xenotimes by SHRIMP	2017-2019
14	SHE Yuwei	Investigation of iron and chromium isotopes of podiform chromite iron and chromium isotopes of podiform chromite deposits in the YarlungZangbo ophiolite belt, Tibet	2017-2019

15	WANG Dan	The study of sedimentary N-isotopic compositions in the Nanhua basin during the Cryogenian interglacial period	2017-2019
16	WANG Huan	Microstructural, mineralogical and geochemical characteristics of the Wenchuan earthquake fault zone and their deformation mechanisms	2017-2019
17	ZHANG Wen	Age, provenance and tectonic setting of Ji'an and Laoling groups, southern Jilin Province within Jiao-Liao-Ji orogenic /mobile belt	2017-2019
18	ZHANG Xinyan	Joint traveltime inversion of deep seismic sounding and deep seismic reflection to image the crustal structure and the application	2017-2019
19	ZHENG Yong	Timing of brittle deformation within the Longmen Shan fault zone: New insights from 40Ar/39Ar ages of fault-gouges from WFSD-1 drilling core and surface ruptures	2017-2019
20	WANG Yafei	Research on ancient crustal materials in Anshan and eastern Hebei	2017-2019
21	GUO Wenfeng	Silicic magma petrogenesis and evolution and the plumbing system of Wangtian'e volcano: constraint from petrogeochemical evidence and thermodynamic modeling	2017-2019
22	YANG Shaohua	Overring plate properties constraint subduction evolution: the example of the Lhasa Terrane	2017-2019
23	ZONG Pu	Study of Late Devonian Famennian brachiopod fauna from western Junggar, Xinjiang	2016-2018
24	LI Ya	The studies of carpological remains of the aquatic angiosperms from the Miocene of northern Hebei Province, China	2016-2018
25	YANG Ben	Systematic and biostratigraphic studies on the early Meishucunian small shelly fossils from the Daibu Member of the Yongshan area in Yunnan Province	2016-2018
26	TIAN Zuolin	Phase equilibrium of the metamorphic PTt paths for granulites from Namche Barwa	2016-2018
27	XIONG Fahui	Origin of platinum group minerals in different types of chromitite from the Purang ophiolite, Tibet	2016-2018
28	DONG Hanwen	Tectonic evolution of the Medog shear zone and its constrains on the formation of the Namche Barwa Syntaxis	2016-2018
29	MA XUxuan	Neoproterozoic magmatic events in the Central Tianshan block, NW China	2016-2018
30	ZHENG Rongguo	The geochronology, petrogenesis, and tectonic significance of the Gongpoquan group volcanic rocks in the Xiaohuangshan-Yueyashan region, Beishan, Inner Mongolia	2016-2018
31	HU Peiyuan	The tectonic significance of Cambrian volcanosedimentary event of the Lhasa terrane, Tibetan plateau	2016-2018
32	GAO Li'e	Himalayan orogenic belt in Caledonian times	2016-2018
33	ZHANG Zhiyu	Genesis of pegmatoid shell: case studies from the super-large Dahutang tungsten deposit in Jiangxi Province	2016-2018
34	SUN Jingbo	Tectono-thermal evolution study of the Aqishan-yamansu area in the eastern Tianshan, NW China	2016-2018
35	YU Shun	The tectono-thermal evolution and uplift/exhumation of thrust-fold zones in the Kuqa-South Tianshan area: constraints from low temperature thermochronometry	2016-2018

36	LI Ming	Graptolite stratigraphic sequence in Nanba, Yiyang of Hunan Province and re-subdivision of the Tremadocian Stage	2015-2017
37	MENG Meicen	Research on lycopsids from the Upper Devonian of the lower reaches of the Yangtze River	2015-2017
38	WU Zhenjie	Cyclostratigraphic study of the Jiangshanian Stage at the Duibian section, Zhejiang	2015-2017
39	KOU Caihua	Petrogenesis of mafic-ultramafic rocks in northern Guangxi and constraints on the tectonic evolution of the western Jiangnan Orogen	2015-2017
40	HUANG He	Mechanism of Nb-Ta enrichment and mineralization in the Boziguo'er alkali granite pluton in the South Tianshan, Xinjiang Province	2015-2017
41	ZHANG Yinghui	Phase equilibria during partial melting of TTG gneisses and petrogenesis of potassic granites in the Hengshan Complex	2015-2017
42	ZHENG Ning	Study of features of early Paleozoic radiolarian siliceous rocks and sedimentary environment in Yongzhou-Pingxiang, Hunan and Jiangxi, South China	2015-2017
43	JIA Jianliang	Research on the conductive mechanism of lacustrine immature organic-rich shale, based on accumulation differences of organic matter and its interpretation model	2015-2017
44	XIE Shiwen	Temporal and spatial distribution and zircon Hf-O isotopes of Paleoproterozoic magmatic rocks in the Jiaodong terrane	2015-2017
45	LIU Jiang	Occurrence and weakening effect of amorphous carbon in the fault slip zone：A case study of the Wenchuan earthquake fault zone	2015-2017
46	LI Shan	Source, petrogenesis and tectonic implications of Triassic granitoids in the Linxi area of Inner Mongolia, southern Central Asian Orogenic Belt	2015-2017
47	SUN Jian	Iron isotope investigation of hydrothermal sedimentary iron deposits: a case study of the Motuosala Iron deposit in Xinjiang Province	2015-2017
48	CHEN Xijie	Petrogenesis and crust-mantle interaction related to early Permian extensional tectono-magmatic assemblages in the Harlik Mt., eastern Tianshan belt	2015-2017
49	LIU Yingchao	Origin of F-rich fluids in carbonate- hosted Pb-Zn deposits in a thrust belt of a collisional orogen: A case study of the Mohailaheng deposit in Qinghai	2015-2017
50	LI Jie	Development of Cenozoic reference material for Ar-Ar dating	2015-2017
51	YANG Jing	$^{40}Ar/^{39}Ar$ geochronology of the oxidation zone of sulfide deposits (Liuhuangshan and Kangguer deposits) from the Tu-Ha basin recorded paleoclimatic significance	2015-2017
52	ZHU Xiaosan	Study of the Precambrian collisional belt between the Yangtze and Cathaysia blocks, based on deep reflection seismic data	2015-2017
53	LI Wenhui	Research on joint inversion of deep seismic sounding and coincident deep seismic reflection data from the Qinling profile	2015-2017

7.2 Projects funded by the Ministry of Science and Technology and/or the Ministry of Finance

One "Deep Structure and Metallogenic Process of Complex Orogenic System in North East" in "Prospecting and Development of Deep Mineral Resources" of National Key Research and Development Program of China was reported successively in 2017, and one "Deep Structure and Metallogenic Process of Collisional Orogenic System of Qinghai-Tibet Plateau" in execution.

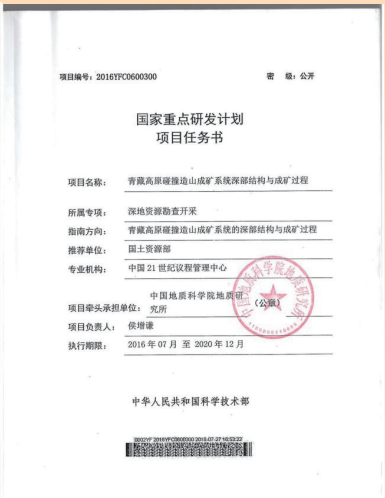


项目编号：2017YFC0601300　　密　级：公开

国家重点研发计划
项目任务书

项目名称：北方东部复合造山成矿系统深部结构与成矿过程
所属专项：深地资源勘查开采
指南方向：北方造山成矿系统的深部结构与成矿过程
推荐单位：国土资源部
专业机构：中国21世纪议程管理中心
项目牵头承担单位：中国地质科学院地质研究所（公章）
项目负责人：秦克章
执行期限：2017年07月 至 2021年06月

中华人民共和国科学技术部
2017年07月11日



项目编号：2016YFC0600300　　密　级：公开

国家重点研发计划
项目任务书

项目名称：青藏高原碰撞造山成矿系统深部结构与成矿过程
所属专项：深地资源勘查开采
指南方向：青藏高原碰撞造山成矿系统的深部结构与成矿过程
推荐单位：国土资源部
专业机构：中国21世纪议程管理中心
项目牵头承担单位：中国地质科学院地质研究所（公章）
项目负责人：侯增谦
执行期限：2016年07月 至 2020年12月

中华人民共和国科学技术部

No	Chief Investigator	Project	Duration
1	QIN Kezhang	Deep structure and ore-forming process of the composite orogenic-metallogenic systems in NE China	2017-2020
2	ZHANG Jin	3D lithosphere framework of compound orogenic belt of North China and its metallogenic background	2017-2020
3	Hou Zengqian	Deep structure and ore-forming process of main mineralization systems in the Tibetan Orogen	2016-2020
4	Lu Zhanwu	Fine structure of the lithosphere and deep processes in the main collision zone of the Tibetan Plateau	2016-2020
5	Li Qiusheng	Fine lithospheric structure and deep processes of the side colliding belt of Tibetan plateau	2016-2020
6	Yang Zhiming	Deep structure and ore-forming process of the main porphyry Cu-Mo-Au systems in the Tibetan Orogen	2016-2020
7	Zhang Zeming	Deep Earth processes and ore-forming events in the Tibetan Orogen	2016-2020
8	Kuang Hongwei	Meso- to Neoproterozoic stratigraphic frame and depositional event correlation in China	2016-2020
9	XU Zhiqin	Tectonic regime and exploration prospecting of the central part of the main subduction-collision metallogenic belt, southern Tibet	2015-2017
10	TANG Suohan, LI Jie	Preparation of geochemical reference materials for Sm-Nd isotope measurement of silicate and (U-Th)/He dating of zircon	2015-2017
11	WANG Tao	Superposition of the Mongol–Okhotsk plate tectonic regime on the Paleo-Asian oceanic plate and its metallogenic systems	2013-2017
12	LIU Dunyi	R & D of new models of TOF-SIMS for isotope geology	2011-2017

7.3 Projects funded by the China Geological Survey

No.	Chief Investigator	Project	Duration
1	GUAN Ye	Application and demonstration of 3D geoscience survey of southeastern areas in Inner Mongolia	2016-2018
2	ZHANG JianXin	Geological survey project for Tethys-Tibet Plateau and tectonic setting of major metallogenic belts	2016-2018
3	LV JunChang	Database construction of index fossils in paleontology	2016-2018
4	LIU FuLai	Key geological issues of the North China Craton and its margin and metamorphic and pilot mapping	2016-2018
5	HOU HeSheng	Geological and geophysical survey of deep oil and gas in the Songliao Basin	2016-2018
6	REN JiShun ZHAO Lei	Tectonic research and related map compilation for land and sea of China and adjacent area	2016-2018
7	JI ShuAn	The standards of regional strata and biota evolution in key areas and sedimentary rock geological pilot mapping	2016-2018
8	HOU ZengQian	Geological survey of the Gangdise-Sanjiang giant metallogenic belt and comparison of ore-forming processes with the Middle Tethyan metallogenic belt	2016-2018
9	DING XiaoZhong	Geological tectonic division and comprehensive integration of regional geological survey of China	2016-2018
10	WANG Jun	Integrated mapping and comparison of the cross-border metallogenic belt in central East Asia	2016-2018
11	ZHANG ZeMing	Key tectonic survey and pilot mapping of orogenic belts	2016-2018
12	XUE HuaiMin	Study on major Phanerozoic magmatism evens in China and tentative mapping of igneous rocks	2016-2018
13	YANG JingSui	A comprehensive survey of chromite in the Yarlung-Zangbo and Bagong- Nujiang suture zones, Tibet	2016-2018
14	LI QiuSheng	Deep geological survey along the Qinzhou-Hangzhou tectonic belts and adjacent areas	2017-2017
15	XIONG XiaoSong	The deep seismic probing of the crustal structure in the Qilian-Tianshan moutain belts and adjacent basin-range contact zone	2017-2017
16	YU ChangQing	Basic geological survey of oil and gas in the southwest and southeast depressions of the Tarim Basin	2017-2018
17	Yang TianNan	Three typial deposits mapping with 1: 25000 scale of the Tibetan Plateau	2017-2019

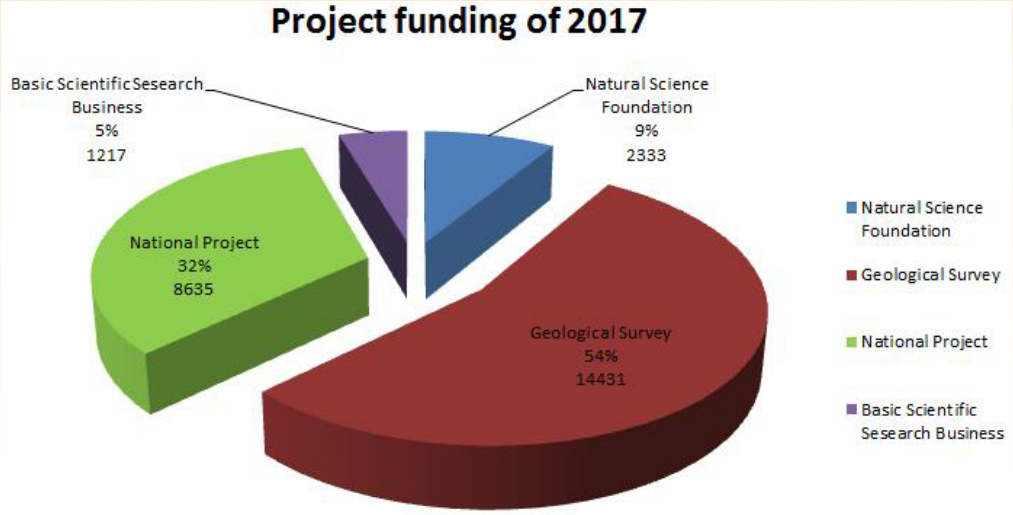
7.4 Basic Scientific Research Foundations

8 programs were funded by overall basic scientific research foundations for the Chinese Academy of Geological Sciences, and 21 programs were funded by the Institute of Geology, Chinese Academy of Geological Sciences in 2017.

Basic Scientific Research Foundations of the Chinese Academy of Geological Sciences			
No.	**Chief Investigator**	**Project**	**Duration**
1	Chen Wen	Demonstration Application of Low Temperature Thermal Chronology and Development of Paleozoic Argon-Argon Age Standard Substance	2017-2019
2	Li Shan	Deep Material Source and Shallow Material Circulation of Mesozoic Granitic Magma in the South of Great Khingan	2017-2019
3	Liu Fulai	Eastward Extension, Space Distribution and Composite Orogeny of Sulu Ultrahigh-Pressure Metamorphic Belt	2017-2019
4	Liu Yan	Geochemical Behavior of REE Element in the Process of Evolution of Carbonatite Complex Fluid	2017-2019
5	Su Dechen	Soft-Sediment Deformation and Triggering Mechanism in Mesoproterozoic - Lower Palaeozoic of North China	2017-2019
6	Zhai Qingguo	Reconstruction of Paleo-Tethys Ocean: Take Qiangtang and Sanjiang area as examples	2017-2019
7	Zhang Cong	Comprehensive Comparative Study for Ultrahigh-Pressure Minerals of Global Typical Ophiolite Continental Lithosphere and Their Host Rocks	2017-2019
8	Peng Nan	Research on Mesozoic Uneven Transfer in South China	2017-2019
Basic Scientific Research Foundations of the Institute of Geology, Chinese Academy of Geological Sciences			
No.	**Chief Investigator**	**Project**	Duration
1	Shen Tingting	Research on Petrography and Geochemistry of Various Vein Substances in Ultrabasic Rock Area of Southwest Tianshan	2017-2019
2	Li Yibing	Substrate Substances from Izu-Bonin-Mariana Island Arc in Western Pacific	2017-2019
3	Ma Xuxuan	Gangdise Nyemo Gneiss Dome Formation Mechanism and Tectonic Significance	2017-2018
4	Zheng Yong	Formation Age of Klippe at East Margin of Qinghai-Tibet Plateau: Constraint for Uplift History of Longmen Mountains	2017-2018
5	Hu Peiyuan	Neoproterozoic Remnant Ocean Crust of Lhasa Block in Qinghai-Tibet Plateau and Its Tectonic Significance	2017-2019
6	Zheng Rongguo	Research on Kitayama Complex Age and Its Tectonic Attribute	2017-2019
7	Jia Jianliang	Efficient Organic Carbon Burial Mechanism Recorded by Continental Deposit Response at Cretaceous OAE3 Period and Its Oil and Gas Significance	2017-2017
8	Wang Tao	Petrographic Composition and Accretionary Orogenic Process of Lajishan Melange Belt in the Middle Qilian	2017-2018
9	Xiang Zhong Jin	Research on Silurian Volcanoclastic Rock of North Daba Mountain	2017-2018
10	Yang Zhiming	Research and Application for LA-ICP-MS Micro-Region Analysis System of Mineral/Inclusion Constituent	2017-2018
11	Bao Zemin	Influence on SHRIMP U-Pb Dating from Characteristics of Double Oxygen Plasma Source	2017-2018
12	Xie Shiwen	Research on Source and Structural Setting of Neoproterozoic Penglai Group Substances in Eastern Shandong	2017-2019
13	Cai Jia	Research on Metamorphism and Chronology of High-Pressure Basic Granulite of Wuhe Group at South Margin of Shandong-Liaoning-Jilin Mobile Belt	2017-2018
14	Wang Wei	Research and Comparison for Archaean Magmatism at South and North Sides of Liaoning-Jilin Tectonic Belt	2017-2018
15	Zhang Wen	Features of Provenance at Stratigraphic Age of Mashan Group in Jiamusi Block, Heilongjiang Province and its Tectonic Significances	2017-2019
16	Li Jin	Research on Black Shale and Magnetite-Iron Isotope Standard Substances	2017-2019
17	Shen Weibing	Research on Classification and Correlation of Sedimentary Strata in Marinoan Glacial Period of Nanhuan System in South China	2017-2019
18	Yin Jiyuan	Ar-Ar Chronology, Lithogeochemical Features and Tectonic Significance of Paleozoic Basic Dyke in Western Junggar .	2017-2017
19	Yan Bin	Geochemical Cycling of Zinc Isotope upon Neoproterozoic “Snowball Earth” Incident	2017-2019
20	Yang Ben	Comparative Research on Early Small Shelly Fossil in Meishu Village, Ganluo Area, Sichuan	2017-2019
21	Shi Rui	Prediction Evaluation for Mineral Resources based on Three-Dimensional Geological Modeling - Taking Qian’an Ore-Concentrated Area for Example	2017-2019

7.5 Project funding

In 2017, CNY 268 million was spent on the project of Institute of Geology, including CNY 144.31 million for geological survey, accounting for 54%; CNY 12.17 million for basic scientific research business, accounting for 5%; CNY 86.35 million for such other national science and technology projects as special national project and public welfare, accounting for 32%; and CNY 23.33 million for National Natural Science Foundation Projects, accounting for 9%.



8 2017 International Cooperation and Academic Exchange

8.1 Brief introduction

The Institute of Geology has established sound cooperative relationships with more than 60 scientific research institutions and universities in more than 20 countries and regions, including the United States, Russia, France, Britain, Germany, and Japan, and has undertaken more than 30 international cooperative research programs.14 experts hold important positions in international academic institutions, and more than 40 foreign scholars have been appointed as guest researchers at the institute. 4 famous foreign scholars with long-term associations with the institute have won Chinese Government Friendship Awards.

Marie-Luce Chevalier

Allen Nutman

Yildirim Dilek

Paul T Robinson

Stephen Clement

In recent years, the Institute of Geology has held many international and domestic academic conferences, which have had significant academic influence both at home and abroad. The institute implements the International Geological Mapping Projects in Asian countries, and has established a new platform for international academic communication and cooperation. The Beijing SHRIMP Center has become a significant platform supporting the development of solid-earth science and implements international academic exchanges. Chinese Continental Scientific Drilling has attracted many foreign geologists into cooperative projects with Chinese geologists. The institute has published its own English-language annual reports since 2010.

8.2 Projects (including IGCP projects)

No.	Chief Investigator	Project	Duration
1	HOU Zengqian	Comparison of the main metallogenesis of the Himalayan-Zagros collisional orogenic system	2014-2018
2	LI Haibing	Fault Friction over Time: Coseismic Weakening and Postseismic Healing in situ	2016-2020
3	YIN Jiyuan	Tectonics and geodynamics of the Altai-Junggar intracontinental orogen in the Vendian-Paleozoic	2017-2018
4	YU Changqing	Dense profile probing depth extent of Pengguan Complex and Longmenshan Fault	2018-2020
5	YANG Jingsui	Diamond in Oceanic Peridotites -Chromitites and Deep Recycled Mantle in the Global Ophiolite Record	2018-2022
6	YANG Jingsui	IGCP-649: Diamonds and Recycled Mantle	2015-2019
7	WANG Tao	IGCP-662: Orogenic architecture and crustal growth from accretion to collision: examples from the Central Asian Orogenic Belt and Tethyan Orogen	2018-2022

8.3 Attendance at International Conferences

17 geologists of the Institute attended the Goldschmidt2017 conference (Paris, France)

Invited by Dr. Alice WILLIAMS of the European Association of Geochemistry, and headed by Academician YANG Jingsui, 17 geologists of the Institute attended the Goldschmidt2017 conference held on 13 to 18 August 2017, Paris, France. The team delivered 6 oral presentations and 11 poster presentations at the conference.

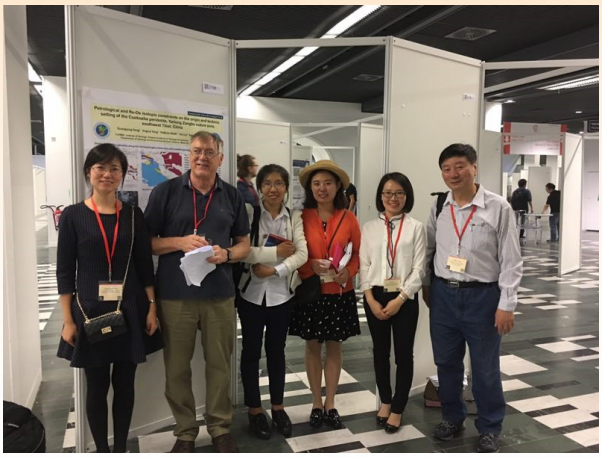


Figure 8.3.1. Group photo of part of the attendees of the institute at the conference.

Figure 8.3.2. Group photo of part of the attendees of the institute at the conference.

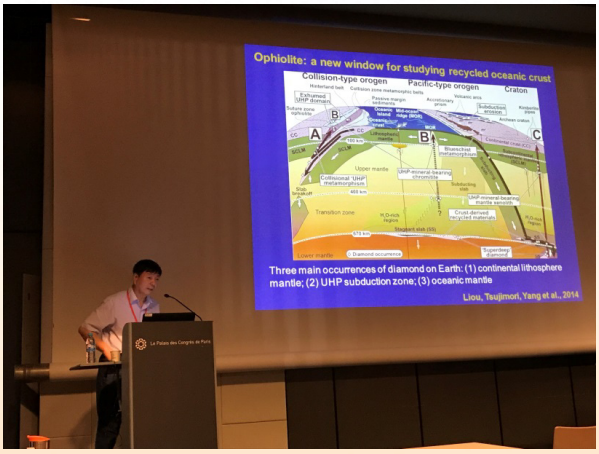


Figure 8.3.3. YANG Jingsui delivers a presentation.

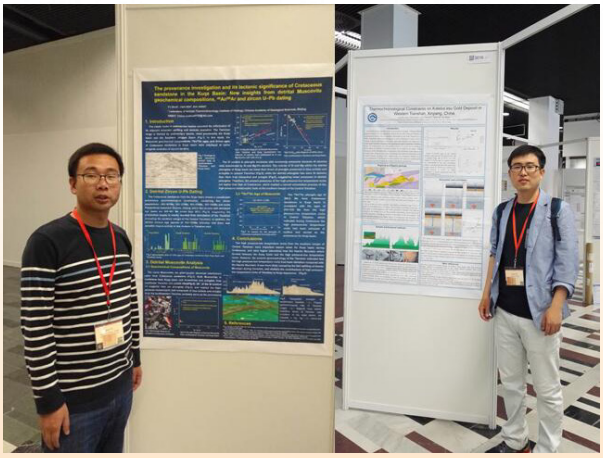


Figure 8.3.4. YU Shun (left) and SUN Jingbo (right) at their poster presentations.

LI Haibing and colleagues attended XRF Core Scanning 2017 (Taiwan, China)

Invited by Prof. Sheng-Rong SONG of the Department of Geosciences, Taiwan University, Drs. LI Haibing, SI Jialiang and WANG Huan attended XRF Core Scanning 2017 held in Taiwan, China, on 20-24 March, 2017.

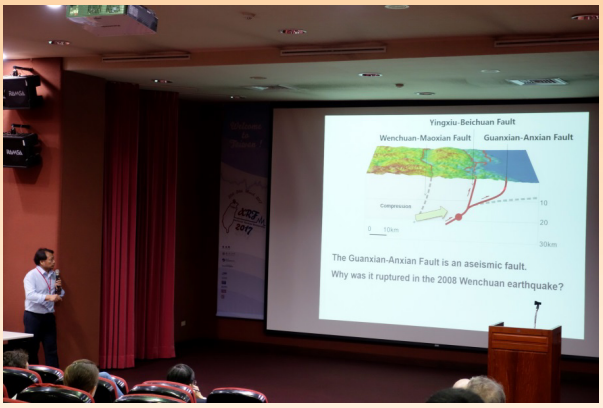


Figure 8.3.5. LI Haibing gives a presentation at the conference.

Figure 8.3.6. LI Haibing and colleagues Visit Xinzhu Synchrotron Radiation Research Center.

YANG Jingsui and colleagues attended the third workshop of IGCP-649 (Diamonds and Mantle Recycling) (Havana, Cuba)

Invited by MSc. Kenya E. Nuñez Cambra, President of the Cuban Geological Society and Organizing Committee and VII Earth Science Convention, Drs. YANG Jingsui, ZHU Xiangkun, CHEN Songyong, ZHANG Cong, SHEN Tingting, NIU Xiaolu, FENG Guangying, QIU Tian, YI Zhiyu, MA Xuxuan and SUN Jian attended the third workshop of IGCP-649 (Diamonds and Mantle Recycling) "CUBAN OPHIOLITES, CHROMITITES AND PERI-CARIBBEAN MANTLE DYNAMICS" held in Havana, Cuba (including 6 days field excursion as part of VII Earth Science Convention), on 3 to 18 April, 2017.

Figure 8.3.7. Ms. Kenya E. Nuñez Cambra, President of the Geological Society of Cuba, makes a welcoming speech.

Figure 8.3.8. The third workshop of IGCP-649.

YU Changqing and colleagues attended the General Assembly 2017 of the European Geosciences Union (Vienna, Austria)

Invited by Dr. Katrin Krüger, Conference Manager of the General Assembly 2017 of the European Geosciences Union (EGU), Drs. YU Changqing, LI Qiusheng, HAN Jianguang, ZHANG Hongshuang and YE Zhuo attended the General Assembly 2017 held on 23–28 April 2017 in Vienna, Austria.

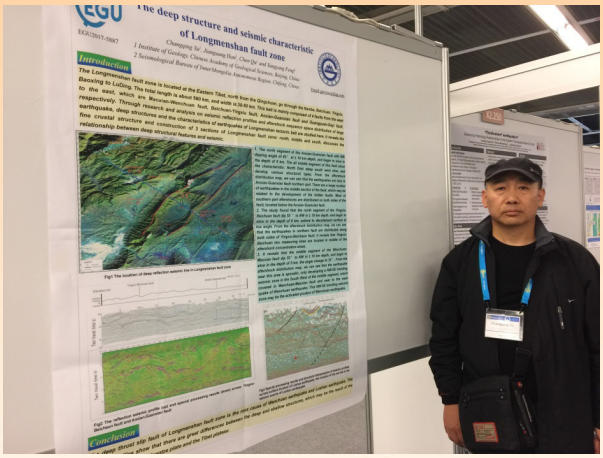


Figure 8.3.9. YU Changqing delivers a poster presentation.

Figure 8.3.10. LI Qiusheng, ZHANG Hongshuang and YE Zhuo at the Assembly.

WANG Tao and colleagues attended the 2017 Annual Meeting of the GAC/MAC (Kingston, Canada)

Invited by Prof. Shoufa LIN of the University of Waterloo, Drs. WANG Tao, XUE Huaimin, YAN Zhen, TONG Ying, GUO Lei, ZHAI Qingguo, TIAN Zhonghua, LI Jinyi, ZHANG Jin, and LIU Jianfeng attended the 2017 Annual Meeting of the GAC/MAC in Kingston and a field excursion in the Appalachian orogen, Canada, held from 12 to 27 May, 2017.

Figure 8.3.11. WANG Tao (right) exchanges ideas about future cooperation with the Director-General of the Canadian Geological Survey (middle) and Prof. LIN Shoufa (left).

Figure 8.3.12. Group photo of the field excursion.

YANG Jingsui and colleagues attended the 2017 EarthScope National Meeting (Alaska, USA)

Invited by Dr. Jeffrey T. Freymueller of the Geophysical Institute, University of Alaska, Director of EarthScope National Office, Drs. YANG Jingsui, LI Qiusheng and LU Zhanwu attended the Meeting held on 15-18 May, 2017 in Anchorage, Alaska, USA.

LIU Pengju and YANG Ben attended the International Symposium on the Ediacaran-Cambrian Transition (ISECT) 2017 (Newfoundland and Labrador, Canada)

Invited by Prof. Duncan MCILROY, Co-Chair of ISECT 2017 Conference, Drs. LIU Pengju and YANG Ben attended the International Symposium on the Ediacaran-Cambrian Transition held on 20-22 June, 2017 at Memorial University of Newfoundland, St. John's, Newfoundland and Labrador, Canada. They also participated in the Pre Meeting Field Trip 1 on 17-20 June and the Post Meeting Field Trip 4 on 23-29June.

Figure 8.3.13. Prof. LIU Pengju points to the extended layer of the GSSP of Precambrian-Cambrian boundary at Fortune Head of Newfoundland, Canada.

Figure 8.3.14. Canadian paleontologist Prof. Guy NARBONNE discusses the Ediacaran macrofossils at the quarry with his knees laying on the ground at Newfoundland, Canada.

SUN Jian attended the JpGU-AGU Joint Meeting 2017 (Chiba, Japan)

Invited by Dr. Hisayoshi Yurimoto of the Japan Geoscience Union, Chair of the JpGU-AGU Joint Meeting 2017, Dr. SUN Jian attended the Meeting, held from 20 to 25 May, 2017 at Makuhari Messe, Chiba, Japan.

Figure 8.3.15.The poster session of the Meeting

YANG Tiannan and colleagues attended the EGRU FUTORES II conference (Queensland, Australia)

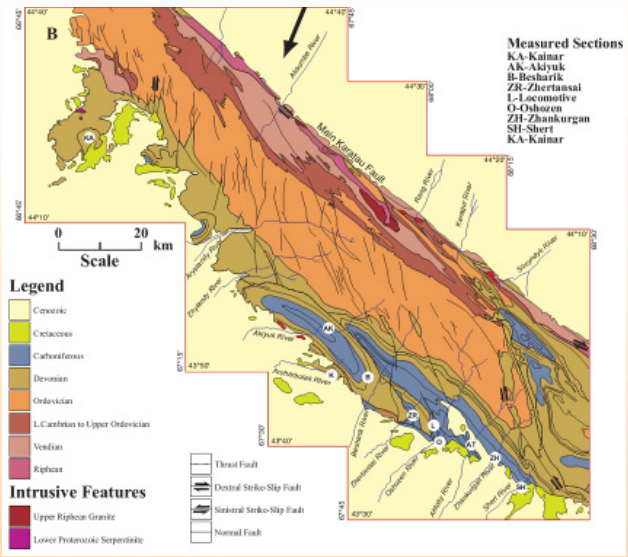
Invited by Prof. Zhaoshan CHANG, Chair of FUTORES II (Future Understanding of Tectonics, Ores, Resources,

Environment and Sustainability) Conference and Director of EGRU (Economic Geology Research Centre) of the College of Science and Engineering of James Cook University, Drs. YANG Tiannan, ZHU Xiangkun, YANG Zhiming, LI Zhihong, SUN Jian and YAN Bin attended the EGRU FUTORES II conference (including a pre-conference workshop and a post-conference field trip) organized by EGRU at Townsville, Queensland, Australia, during 4-7June 2017.

Figure 8.3.16. Group photo of the attendees and Prof. Zhaoshan CHANG (middle)

Figure 8.3.17. At the field trip.

HUANG Hao and ZHENG Jianbin participated in a field trip to the Upper Devonian-Carboniferous reef buildups of the Bolshoi Karatau Mountains (South Karatau, Kazakhstan)



Invited by Dr. Zholtaev G.ZhK.I. of Satpaev Institute of Geological Sciences, HUANG Hao and ZHENG Jianbin participated in a field trip to the Upper Devonian-Carboniferous reef buildups of the Bolshoi Karatau Mountains in South Karatau, Kazakhstan, held on 15–21 August, 2017.

Figure 8.3.18. Simplified geological map of Bolshoi Karatau, Kazakhstan, with locations of key sections

ZHANG Jianxin and colleagues attended the 12th International Eclogite Conference (Sweden and Norway)

Invited by Dr. Jaroslaw MAJKA of the Department of Earth Sciences of Uppsala University, Drs. ZHANG Jianxin,

YANG Jingsui, MENG Fancong and ZHANG Cong attended the 12th International Eclogite Conference in Are, Sweden, on 20-29 August, 2017, including pre- and post-conference scientific excursions in the Scandinavian Caledonides (Sweden and Norway).

Figure 8.3.19. Group photo of the attendees.

Figure 8.3.21. At the field trip.

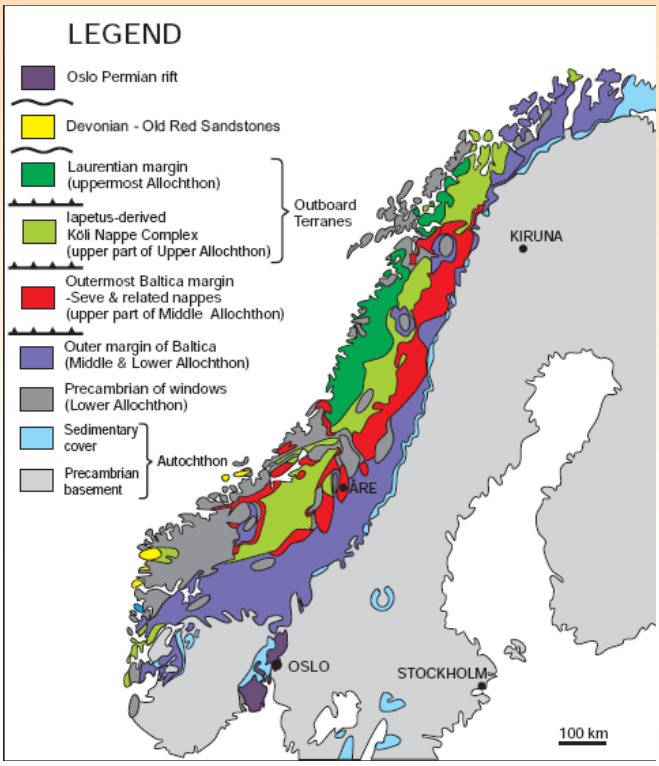


Figure 8.3.20. Tectonic map of the Scandinavian Caledonides, after Gee et al., 2010.

LV Junchang attended the Society of Vertebrate Paleontology Annual Meeting (Calgary, Canada)

Invited by Dr. Darla ZELENITSKY, Assistant Professor of the Department of Geoscience, University of Calgary, Dr. LV Junchang attended the Society of Vertebrate Paleontology Annual Meeting held in Calgary, Alberta, Canada from 23 to 26 August, 2017.

WANG Tao and colleagues attended the Second Russia-China International Meeting on the Central Asian Orogenic Belt (Irkutsk, Russia)

Invited by Dr. D. P. GLADKOCHUB, Director of the Institute of the Earth Crust, Siberian Branch of the Russian Academy of Sciences, Drs. WANG Tao, TONG Ying, GUO Lei, ZHANG Lei, LI Shan, HUANG He, ZHANG Jianjun and HOU Hesheng attended the Second Russia-China International Meeting on the Central Asian Orogenic Belt held in Irkutsk, Russia during the period of 6-12 September, 2017.

Figure 8.3.22. WANG Tao and colleagues deliver presentations.

Figure 8.3.23. Photos of the field excursion.

LIU Fei attended the 11th International Kimberlite Conference (IKC) (Gaborone, Botswana)

Invited by Dr. Barbara Scott Smith, 11 IKC Co-Convenor, Dr. LIU Fei attended the 11th International Kimberlite Conference and the associated Field Trip, held in Gaborone, Botswana, on 18-22 September, 2017.

Figure 8.3.24. Group photo of the 11 IKC.

Figure 8.3.25. Group photo of the Field Trip.

JIN Xiaochi and colleagues attended the 6th International Conference on the International Geosciences Correlation Programme (IGCP) Project 589: Development of the Asian Tethyan Realm: Genesis, Process and Outcomes (Kraków, Poland)

The 6th International Conference on the IGCP Project 589 was held from28 September to 5 October, 2017 in Kraków, Poland. As the IGCP-589 Project leader, Dr. JIN Xiaochi delivered a keynote speech entitled "Six years of IGCP-589", Drs. HUANG Hao and ZHENG Jianbin delivered two other presentations. They also participated in post symposium field excursion to Carpathians.

Figure 8.3.26. JIN Xiaochi addresses the Opening Ceremony.

Figure 8.3.27. HUANG Hao and ZHENG Jianbin at the field excursion.

YANG Jingsui and colleagues attended the Geological Society of America (GSA) Annual Meeting and Exposition (Seattle, USA)

Invited by Dr. Vicki S. McConnell, GSA Executive Director, Drs. YANG Jingsui, REN Liudong, LIU Fei, MA Xuxuan, DONG Hanwen, NIU Xiaolu and FENG Guangying attended the GSA Annual Meeting and field trips held on 18–28 October 2017, in Seattle, Washington, USA.

Figure 8.3.28. YANG Jingsui hosts the session.

Figure 8.3.29. REN Liudong gives an oral presentation.

Figure 8.3.30. Some of the photos taken during the field trips

LI Haibing and colleagues attended the 2017 Fall Meeting of the American Geophysical Union (AGU) in New Orleans, USA

The 2017 Fall Meeting of the American Geophysical Union (AGU) was held on 11-15 December in New Orleans, Louisiana, USA. Drs. LI Haibing, HE Bizhu, LIU Dongliang, PAN Jiawei, LU Haijian, WANG Huan, ZHENG Yong, ZHANG Lei, DONG Hanwen, LI Yibing, QU Chen and HU Peiyuan attended the meeting. They delivered oral and poster presentations.

8.4 Foreign visits by members of the Institute

PAN Xiaofei visited the Colorado School of Mines (Illinois, USA)

Invited by Prof. David LEACH of the Colorado School of Mines (CSM), USA, Dr. PAN Xiaofei visited the Department of Geology and Geological Engineering at CSM to conduct collaborative research as a visiting scientist from 30 November, 2016 to 27 July 2017.

Figure 8.4.1. At the field trip to Steamboat Springs, Colorado

LIU Fulai and colleagues conducted isotopic analyses at the University of Tokyo (Tokyo, Japan)

Invited by Dr. Tsuyoshi IIZUKA of the Department of Earth and Planetary Science, University of Tokyo, Drs. LIU Fulai, LIU Jianhui and CAI Jia conducted research and undertook collaborative work with Dr. Tsuyoshi IIZUKA and other members of the academic staff in this Department from 18 May to 16 June 2017. They conducted U-Th-Pb dating, REE and Lu-Hf isotopic analyses on zircon, monazite, apatite, and xenotime separated from various metamorphic and granitic rocks collected in Archean basement and Paleoproterozoic orogenic belts of the North China Craton as well as orogenic belt in Yunnan area. During their stay in Japan, they also attend the JpGU-AGU Joint Meeting 2017, and delivered two oral presentations.

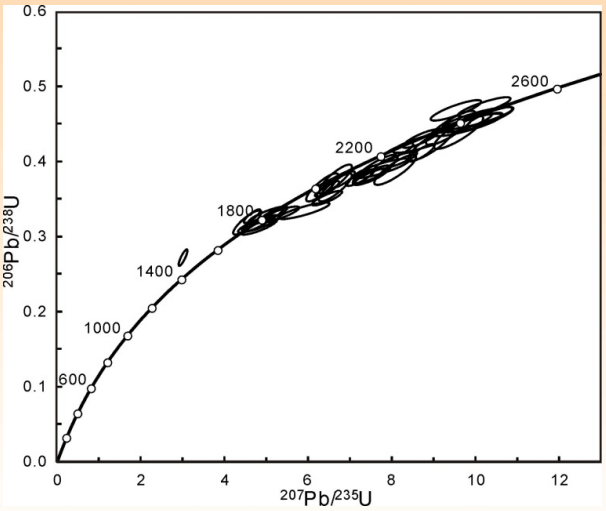


Figure 8.4.2. Monazite U-Th-Pb age dating results (LX199-2.1)

YIN Jiyuan conducted cooperative research at the Arizona State University (Arizona, USA)

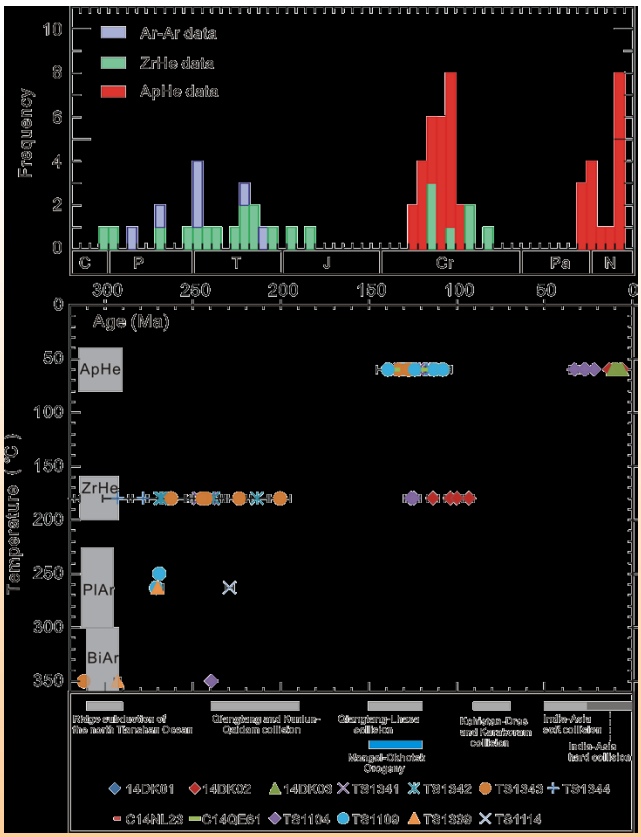


Figure 8.4.3. Thermochronological plot of the central Tianshan derived from the data.

The apatite and zircon (U-Th)/He data Dr. YIN Jiyuan generated at the Arizona State University (ASU) last year stimulated some exciting ideas for a new thermochronologic study of the West Junggar and Tianshanorogenic belts in west China. Prof. Kip Hodges of the School of Earth and Space Exploration of ASU invited Dr. YIN Jiyuan to collaborate on this work in their Noble Gas Geochemistry and Geochronology Laboratories, and to write papers on the results together, from 29 April to 6 July, 2017.

MENG Fancong and FAN Yazhou participated in field trips in the Polar Urals (Russia)

The Institute of Geology and Geochemistry of Ural Branch of Russian Academy of Sciences invited Drs. MENG Fancong and FAN Yazhou to take part in field trips in the Polar Urals (Labytnangy, Tyumen region) of Russia from 1 to 31 July, 2017.

Figure 8.4.4. The route of the field trips in the Polar Urals.

Figure 8.4.5. Group photo of participants of the two sides to the field trip.

ZHU Xiaosan conducted regional geological survey and investigation of typical deposits (Mazatlan, Mexico)

In reference to the two Specific Collaboration Agreements signed by the Mexican Geological Survey (MGS) and the China Geological Survey (CGS), the CGS delegation visited Mexico for joint collaboration of database revision, geochemical samples composition, lab protocols, geological correlation, and exchange of experiences in uranium exploration and rare earths, medical geology and geopark projects. Dr. ZHU Xiaosan, as one member of the delegation, conducted regional geological survey and investigation of typical deposits in Mazatlan of Mexico from 15 to 29August, 2017.

Figure 8.4.6. Discussion during the field trip (ZHU Xiaosan in the middle).

TONG Ying and colleagues participated in a joint field trip in the South of Mongolia

According to the agreement between the Institute of Paleontology and Geology, Mongolian Academy of Sciences (IPG MAS) and the Institute of Geology, CAGS, Drs. TONG Ying, XUE Huaimin, GUO Lei and ZHANG Lei were invited to attend the international fieldwork onthe Project of “Geology, tectonics and metallogenesis of South Mongolia” during 4 June to 28 June 2017.

Figure 8.4.7. The campsite of the fieldwork.

Figure 8.4.8. Group photo of participants of the two sides to the field trip (at Khanbogd).

YANG Ben joined field research in West and North Mongolia

Invited by Prof. Gerel Ochir, Director of the Geoscience Center of the School of Geology and Mining, Mongolian University of Science and Technology, Dr. YANG Ben visited this university and joined the research team for the planned field research on the Ediacaran and early Cambrian stratain in West and North Mongolia, during the period of 4-30 July, 2017.

Figure 8.4.9. YANG Ben Samples the Cambrian small shelly fossils at the section of Oroganl Gol with herds far at the foot of mountain.

Figure 8.4.10. Walks back to camping site at the Orogan Gol Valley (hiring a Mongolian boy and his horse to help him carry samples)

WAN Yusheng and colleagues carried out field investigation on the archean granite-greestone belt in Western Australia

Invited by Prof. Simon A. Wilde at Curtin University and Prof. Martin van Kranendonk at New South Wales University (both are IPRCC core members), Prof. Yusheng Wan and the other four members of the Beijing SHRIMP Center of the institute visited Western Australia and carried out a 23 days' field investigation in Yilgarn Craton and Pilbara Craton from 17 August to 8 September of 2017. With the guide of Prof. Wilde, they visited Jack Hills, where the oldest zircon grain (4.4 Ga) on the Earth was reported, and Mt. Narryer, where the oldest granitic gneisses (3.7

Ga) were reported. Metasedimentary rocks including conglomerate, sandstones and BIFS were also examined, based on which the Hadean and Paleoarchean geological evolution of the Yilgarn Craton were discussed by Chinese and Australian geologists in the field. After the fieldwork in Yilgarn Craton, the delegation went to Pilbara Craton together with Prof. Van Kranendonk, where the most typical Archean dome-keel structure was preserved. The dome-keel structure were formed by doming of buoyant TTG rocks and sinking of high-density greenstones, which was regarded as the representative vertical movement that dominated in the Archean. They also visited the Hamersley BIFS, the largest BIF in the world, the stromatolites (3.4 Ga and 2.7 Ga), hot spring sediments, pillow basalts and so on. During the field trip, a large amount of samples were collected for exhibition, including the Jack Hill conglomerate, the Narryer TTG gneiss, and the 3.4 Ga stromatolite.

Figure 8.4.11. Left: the Jack Hill conglomerates, where the oldest zircon grain (4.4 Ga) on the Earth was reported; Right: gravels containing Hadean detrital zircon grains (4.1~4.2 Ga) in Narryer Terrane.

LIU Fulai and colleagues conducted "Korea-China Co-Field Survey" with counterparts of the Chonbuk National University (Jeonbuk, Korea)

Invited by Dr. LEE NamHo, President of Chonbuk National University, Drs. LIU Fulai, LIU Pinghua and LIU Chaohui, as co-researchers of the"Korea-China Co-Field Survey" hosted by the Department of Earth and Environmental Sciences of this university, participated in the field work to exchange, compare and understand the geology and tectonics of Northeast Asia, especially between Korea and China, during the period of 20 August to 3 September, 2017.

Figure 8.4.12.Group photo of participants of the two sides to the field trip.

Figure 8.4.13. Discussion during the field trip (LIU Fulai in the middle).

LI Haibing and WANG Huan carried out experiments at the Australian Nuclear Science and Technology Organization (Locas Heights, Australia)

Invited by Dr. Joseph Bevitt, Scientific Coordinator of the Bragg Institute, the Australian Nuclear Science and Technology Organization (ANSTO), Drs. LI Haibing and WANG Huan carried out the experiment of "Texture of clay-rich gouge from the Wenchuan earthquake fault zone" at the institute from 30 August to 16 September, 2017.

Figure 8.4.14. WANG Huan carries out experiments.

Figure 8.4.15. LI Haibing exchanges ideas with Dr. Vladimir Luzin at the institute.

GUO Lei participated in a joint field trip in Western and Central Mongolia

According to the agreement between the Institute of Paleontology and Geology, Mongolian Academy of Sciences (IPG MAS) and the Institute of Geology, CAGS, Dr. GUO Lei was invited to attend the international fieldwork onthe Project of "Geology, tectonics and metallogenesis of Western and Central Mongolia" during 22-29August, 2017.

KUANG Hongwei and LIU Yongqing conducted cooperative research with counterparts of the Utah Geological Survey (Utah, USA)

Invited by Dr. James I. Kirkland, State Paleontologist of Utah with the Utah Geological Survey, Drs. KUANG Hongwei and LIU Yongqing collaborated with his team to refine the temporal framework for the Mesozoic of the Northern Hemisphere and to participate in the field trip to investigate the Mesozoic stratigraphy at Arizona, New Mexico and Utah from 27 September to 24 October, 2017.

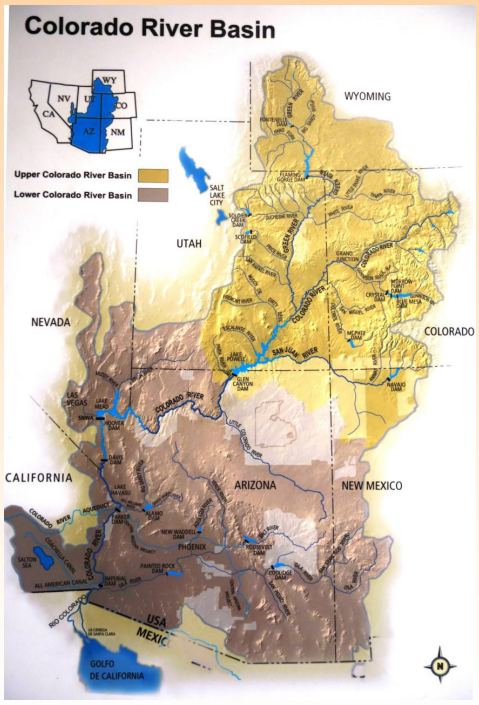


Figure 8.4.16. The area of Mesozoic geological survey in Colorado plateau.

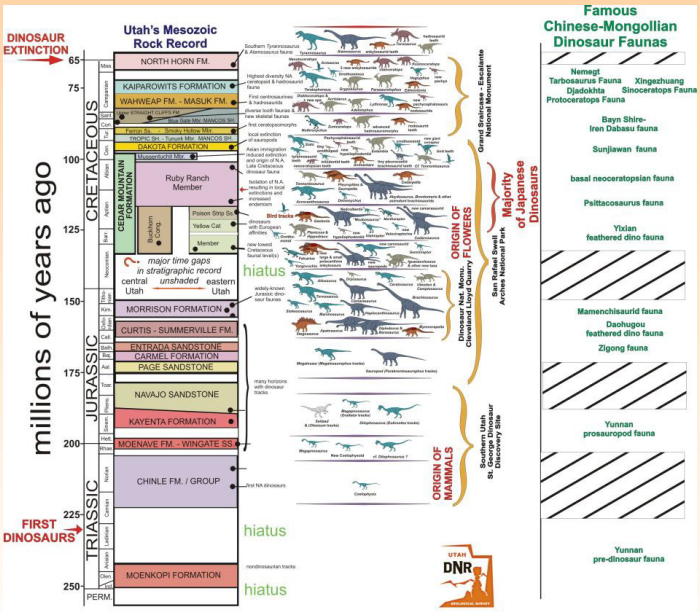


Figure 8.4.17. Mesozoic terrestrial vertebrates fauna and their comparison in North America and China.

LI Yibing analyzed geological samples at the laboratory of the University of Tokyo, (Tokyo, Japan)

Invited by Dr. Tsuyoshi KOMIYA of the Department of Earth Science & Astronomy, University of Tokyo, Japan, Dr. LI Yibing conducted joint research and analyzed some geological samples got from the Integrated Ocean Drilling Program (IODP) Izu-Bonin Mariana Forearc Expedition 352 at the laboratory of this Department from 15 October to 7 November 2017.

LI Shan attended the ACTER field symposium (New South Wales, Australia)

Invited by Prof. Zhengxiang LI, Director of the Australia-China Joint Research Center for Tectonics and Earth Resources (ACTER) of Curtin University, Dr. LI Shan attended the ACTER field symposium in the Lachlan Fold Belt, New South Wales, Australia, on 23-29 October 2017.

Figure 8.4.18. Group photo of the ACTER field symposium

WANG Yanbin conducted experiments and academic exchanges at the Australian National University (Canberra, Australia)

Invited by Prof. Ian Williams of the College of Science, Australian National University, Dr. WANG Yanbin accepted visiting status as a Campus Visitor to carry out experiments and joint research at this university from 22 October to 10 December, 2017.

LIU Yan performed analytical works of the joint research project at the University of Warsaw (Warsaw, Poland)

Dr. LIU Yan was invited to become a member of the Faculty of the University of Warsaw in the role of Visiting Professor, at the time span from 15 October to 10 November, 2017, for the cooperation of the research project "Genesis of selected minerals in nephrites and other metasomatic rocks, based on the content of trace elements and isotope composition of selected elements". He performed analytical works of the research project.

XIONG Fahui visited the Helmholtz Center Potsdam, GFZ German Research Center for Geoscineces (Potsdam,Germany)

Dr. XIONG Fahui was invited for scientific stay at the Helmholtz Center Potsdam, GFZ German Research Center for Geoscineces from 28 December, 2017 to 26 January, 2018, in collaboration with Dr. Richard Wirth to work on the project "Combined FIB/TEM studies on diamonds and corundums from Opholites".

Figure 8.4.19. The Helmholtz Center Potsdam, GFZ German Research Center for Geoscineces

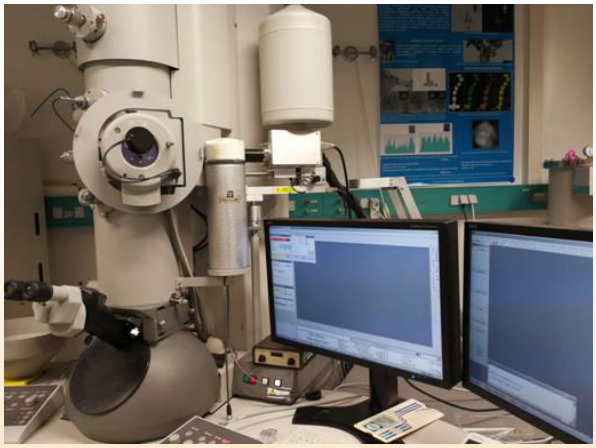


Figure 8.4.20. The transmission electron microscope (TEM)

GUAN Ye visited Paradigm Geophysical and Kinemetrics Inc (Huston and Los Angeles, USA)

Dr. GUAN Ye was invited to visit Paradigm Geophysical in Huston for technical communication during 10-13 December, 2017, and Kinemetrics Inc in Los Angeles, from 14-18 December, 2017 to discuss the seismic observation technology, continental geodynamics, data processing, maintenance of the products (Q330S+ and STS-2.5) and opportunities for their future scientific collaboration.

Figure8.4.21. GUAN Ye (left) visits the Kinemetrics Inc.

Figure8.4.22. GUAN Ye (middle) visits the Paradigm Geophysical.

GAO Rui and colleagues visited Rice University and Stanford University for academic exchanges (Texas and California, USA)

Invited by Prof. Fenglin Niu of the Department of earth science, Rice University, and Prof. Simon Klemperer of the Department of Geophysics, Stanford University, Academician GAO Rui, Drs. LI Wenhui and LI Hongqiang visited these two universities respectively to integrate seismic images, as well as exchange ideas on their interpretations; show and discuss the data from Academician GAO's new seismic reflection profiles from southern Tibet, talking about applying for new projects together, in December 2017. They also attended the 2017 AGU Fall Meeting.

8.5 Academic Visitors to the Institute

Visit from David LEACH, Colorado School of Mines, USA

Invited by Dr. SONG Yucai, Dr. David LEACH (former researcher of the U.S. Geological Survey) of the Colorado School of Mines, USA, who is an Honorary Professor of the Institute of Geology, visited the Institute of Geology and conducted collaborative research for three months of 2017. During his stay, he delivered an oral presentation entitled “Evaporates and sediment-hosted Zn-Pb-Ag deposits: An evolving perspective from North Africa, China, Peru, North America” as part of the academic activities for the celebration of the 60th Anniversary of the founding of CAGS.

Visit from well-known Korean geological scholar Oh S.W.

Invited by Dr. LIU Fulai, Prof. Oh S.W., renowned Korean geological scholar specialized in metamorphic rocks and isotope chronology, visited the Institute of Geology during 24-30 March, 2017, for joint field trips to Jilin Province of China.

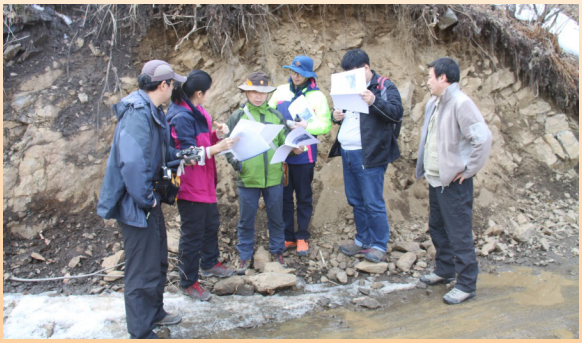


Figure8.5.1. Discussion during the field trip.

Visit from Nicholas Stanley BELSHAW, Oxford University, UK

Invited by Dr. ZHU Xiangkun, Prof. Nicholas Stanley BELSHAW from the Department of Earth Sciences, Oxford University, UK, conducted cooperative research in the Key Laboratory of Isotope Geology of the Institute of Geology from 28 May to 1 June, 2017.

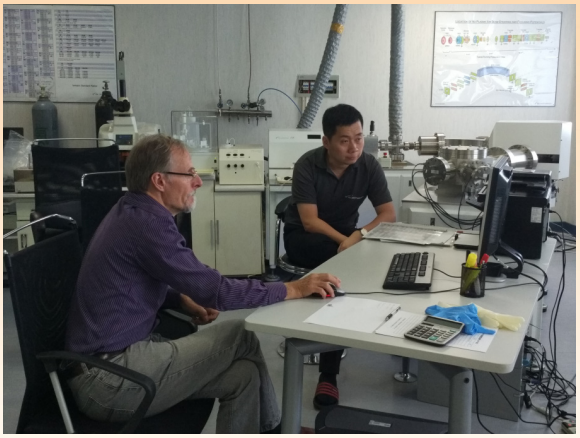


Figure8.5.2. Nicholas Stanley Belshaw (left) debugs the instruments.

Visit from Eric Charles Ferre, Southern Illinois University, Carbondale, USA

Invited by Dr. LI Haibing, Prof. Eric Charles Ferre from Southern Illinois University visited the Institute of Geology for collaborative research during 12-15 June 2017. During his stay, he delivered a presentation entitled "Research on faults and magnetism".

Figure8.5.3. Prof. Eric Charles Ferre gives a presentation.

Figure8.5.4. Prof. Eric Charles Ferre visits the drill core store in Sichuan Province.

Visit from Igor V. KEMKIN, Far East Geological Institute, Far Eastern Branch of Russian Academy of Sciences, Russia

Invited by Dr. LIU Yongqing, Prof. Igor V. KEMKIN from Far East Geological Institute, Far Eastern Branch of Russian Academy of Sciences, Russia, visited the Institute of Geology during 7-13 July 2017, for academic exchanges. During his stay, he delivered a presentation entitled "Composition of Nadanhada Terrane and OPSreconstruction for tectonic implications".

Figure8.5.5. Academic exchanges between Prof. Igor V. KEMKIN and Dr. LIU Yongqing's team.

Figure8.5.6. Joint field trip to Heilongjiang Province.

Visit from James Ian KIRKLAND, the Utah Geological Survey, USA

Invited by Prof. KUANG Hongwei, Dr. James Ian KIRKLAND from the Utah Geological Survey, USA, visited the Institute of Geology for collaborative research from 15 June to 2 July, 2017. During his stay, he delivered a presentation entitled "Utah's Outstanding Dinosaur Heritage".

Figure8.5.7. Academic exchanges between Dr. James Ian KIRKLAND and Prof. KUANG Hongwei's team.

Figure8.5.8. Dr. James Ian KIRKLAND at the field trip to Shanxi Proveince.

Visit from Giulio Di Toro, the University of Padova, Italy

Invited by Dr. LI Haibing, Prof. Giulio Di Toro from the University of Padova, Italy visited the Institute of Geology for collaborative research during 7-15 November 2017. He delivered four presentations entitled "A close look at the earthquake engine", "Fault weakening mechanisms in carbonate-bearing rocks during earthquakes", "What is the

earthquake fracture energy?" and "SHIVA : a rotary shear machine designed to investigate the seismic cycle in the lab".

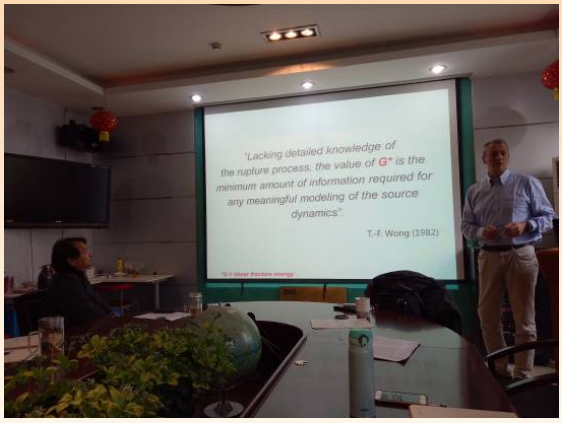


Figure8.5.9. Prof. Giulio Di Toro gives a presentation.

Figure8.5.10. Prof. Giulio Di Toro visits the Wenchuan earthquake fault science drilling project (WFSD) site.

Visit from Alfred KRÖNER, the University of Mainz, Germany

World famous geologist and Honorary Professor of the Beijing SHRIMP Center of the Institute of Geology, Prof. Alfred KRÖNER, visited the Beijing SHRIMP Centre for collaborative research in March to May, as well as August to November of 2017, respectively. During his visits, Prof. Kröner also helped with the organization of the International Precambrian Research Centre of China (IPRCC) annual academic events.

Visit from Steve CLEMENT, Ion Optical Consulting, Canada

The well-known Canadian specialist on Mass Spectrometry, Dr. Steve CLEMENT visited the Beijing SHRIMP Center twice in April and October of 2017, respectively. The main purpose of his visit was to complete the annual work plan of the Specially-Funded Programme on National Key Scientific Instruments and Equipment Development– "New models of TOF-SIMS for Isotope Geology".

Visit from Michael Brown, University of Maryland and Walter Mooney from the United States Geological Survey, USA

Invited by Prof. WAN Yusheng, Director of the Beijing SHRIMP Center, the core members of IPRCC, Prof. Michael Brown from University of Maryland, USA and Dr. Walter Mooney from the United States Geological Survey visited the Centre from 26 October to 3 November, 2017. Prof. Michael Brown and Dr. Walter Mooney participated in the IPRCC Short Course 2017 - Precambrian Lithospheric Tectonics and Modeling as well as the International Field Excursion in the Three Gorges, Yichang, Hubei Province during their visit.

The trainees of the Training Course on Geological Survey Information Technology for Developing Countries visited the Beijing SHRIMP Center

The China Geological Survey organized the Training Course on Geological Survey Information Technology for Developing Countries. 50 government officials and technicians from 15 developing countries such as Laos Thailand, Morocco and Panama, etc. were invited to attend the course. They visited the Beijing SHRIMP Center New Lab Building on 15 August, 2017. The staff of the Center introduced the achievements of the Center in the field of scientific research and laboratory construction in recent years, and guided the foreign guests to visit the SHRIMP Lab and its affiliated facilities in the Center.

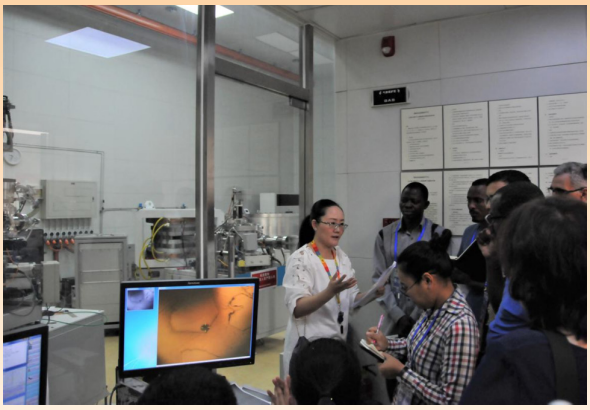


Figure8.5.11. The trainees visit the SHRIMP II Lab of the Center.

Figure8.5.12. The technician of the Center introduces the TOF-SIMS instruments.

Figure8.5.13. Group photo of the trainees and some of the staff of the Center.

9.1 International conferences and field excursions organized and/or held by the Institute

The 2017 International symposium "Zircon geochronology and crustal evolution: the smaller the scale the more we learn"

The 2017 International Symposium "Zircon geochronology and crustal evolution: the smaller the scale the more we learn" was held jointly by the International Precambrian Research Center of China (IPRCC) and Kunming University of Science and Technology (KUST) in C.C. WU's Hall of KUST on 14 April of 2017. The IPRCC core members including Prof. Alfred Kröner and Dr. Yamirka Rojas-Agramonte from University of Mainz, Germany; Prof. Robert Pidgeon and Prof. Simon Wilde from Curtin University, Australia; Prof. Ian Williams from Australian National University; Dr. Stephen Clement, the famous Canadian ion optical expert; Prof. Cho Moonsup from Seoul National University, South Korea; Prof. Zhao Guochun from University of Hong Kong, as well as Prof. Liu Dunyi, Prof. Wan Yusheng, Prof. Shi Yuruo and Dr. Liu Shoujie from the Beijing SHRIMP Center gave a series of excellent oral presentations. More than 150 teachers, university students and local geologists participated in the symposium.

The presentations involved various aspects related to zircon geochronology including: (1) techniques of designing and developing the SHRIMP machine; (2) problems with U-Pb dating on young samples (< 10 Ma) concerning staged decay of U-Th-Pb isotopic systems and its resolution; (3) an example of dating one of the youngest zircons using SHRIMP; (4) dating the lunatic samples, both rocks and meteorite, by using SHRIMP (5) the oldest continental materials in the mainland of China; (6) data interpretation of a complicated Paleoarchean rock sample; (7) geological setting of South Korean and its correlation with the North China Craton; (8) geological evolution of representative Archean cratons. After the symposium, the group went to have a field workshop on key geological problems in Yunan Province, including Sn deposits and related granites, Ailaoshan metamorphic belts, Karst topography and its genetics, and new tectonics.

The 2nd Mt. Taishan Geological Symposium-Advanced Training Course

"The 2nd Mt. Taishan Geological Symposium & Advanced Training Course on Applications of Geochronology and Geochemistry" was jointly held by Shandong Institute of Geological Sciences (SIGS), the Beijing SHRIMP Center (IPRCC) and Geological Society of Shandong from 31 July to 2 August, 2017. The Symposium was the first important international academic exchange organized cooperatively by the Beijing SHRIMP Center and SIGS after the two parties signing the strategic cooperation agreement in order to jointly establish the Shandong SHRIMP Center.

More than 10 experts from Canada, Australia, Peking University, Chinese Academy of Geological Sciences, Sun Yat-sen University and Land, Geology and Mineral Resource Departments of Shandong Province, as well as over 130 university students and geologists from all over China participated in the Symposium and Training Course. The Symposium involved the gold and other precious metal deposits in Australia and their metallogenesis. The new exploration methods by combining geochemistry and biology were introduced with examples in the desert in Australia.

Figure 9.1.1. Group photo of the Training Course.

Chinese researchers also introduced the new models on the metallogenesis of the gold deposits in Shandong Province. Basic geological issues were also discussed, such as the evolution of the greenstone belt and its tectonics, mapping methods of Beishan area, Inner Mongolia, and old continental materials in China.

The IPRCC 2017 International Field Training Course

The IPRCC 2017 International Field Training Course- Greenstone belt and associated TTG-Migmatite suite in Qixingtai area, Western Shandong was jointly organised by the Beijing SHRIMP Center, IPRCC and Shandong Institute of Geological Sciences from 2 August to 5 August, 2017. Prof. Shoufa Lin (University of Waterloo), Jian Zhang (Sun Yat-sen University), Ken Collerson (Queensland University), Cees van Staal (Canadian Geological Survey), Yusheng Wan (CAGS) and Dr. Shoujie Liu (CAGS) were invited as the field guides and lecturers for the course.

Figure 9.1.2. Group photo of the IPRCC 2017 International Field Training Course

The training course was carried out by a way in which the students were given limited basic information and allowed to do the observation themselves, following by discussion with the teachers. Several typical exposures of TTG-greenstones were visited, including a section exhibiting pillow-lava and different structures, an outcrop showing the contact between the 2.7 Ga and 2.5 Ga supracrustal rocks, a section displaying the migmatite and so on. The new way of this field training course not only improved the students' field skills, but also refined their way of thinking in geology.

The 15th International Workshop on the “China-Russia-Mongolia-Kazakhstan-Republic of Korea” Cooperative Project of "Deep Processes and Metallogeny of Northern-Central-Eastern Asia"

The 15th International Workshop on the "China-Russia-Mongolia-Kazakhstan-Republic of Korea" Cooperative Project of "Deep Processes and Metallogeny of Northern-Central-Eastern Asia" was held in Shenyang, China on 12-18 October, 2017. More than 80 experts and scholars from the five countries of Russia, Mongolia, Kazakhstan, Korea and China, such as Mr. Kiselev, Head of Rosnedra, Deputy Minister of Mineral Resources and Environment of the Russian Federation, and leaders of other sides of the project, attended the workshop and participated in a post-conference field excursion to Anshan and Benxi of Liaoning Province of China.

Since the launch of the Cooperative Project in 2002, the five countries have been working in good collaboration with each other for the compilation of maps. The Atlas of Geological Maps of Northern-Central-Eastern Asia and Adjacent Areas at 1: 2.5 Million has been published, including the Geological Map of Northern-Central-Eastern Asia and Adjacent Areas, the Metallogenic Map of Energy Resources in Northern-Central-Eastern Asia and Adjacent Areas (Oil, Gas and Coal), the Tectonic Map of Northern-Central-Eastern Asia and Adjacent Areas, and the Mineragenic Map of Central Asia and Adjacent Areas.

At the Workshop, scientists and leaders of the five countries, highly appreciating the creative multilateral cooperation pattern they have developed in the past 15 years, decided to further their cooperation in a much wider and deeper way.

Figure 9.1.3. Group photo of the Workshop.

Figure 9.1.4. Representatives of the five countries sign the agreed minutes of the Workshop.

Figure 9.1.5. Group photo of the field excursion.

The IPRCC 2017 International Short Course- Precambrian Lithospheric Tectonics and Modeling

The IPRCC 2017 International Short Course- Precambrian Lithospheric Tectonics and Modeling was held at CAGS in Beijing on 27-29 October 2017. Three world-famous specialists, Professor Peter Cawood from Monash University, Australia, Dr. Alan Menzel-Jones from Dublin Institute for Advanced Studies and Dr. Craig O'Neill from Macquarie University, Australia, were invited as lecturers for the course. More than 130 postgraduate students and geologists from all over China participated in the course.

The continental lithosphere is the archive of Earth history, not only of the exposed crust but through the rock record of the atmosphere, hydrosphere, and biosphere, and of the mantle through its interactions with the crust. The evolution of plate tectonics on Earth has had fundamental effects of the evolution of the surface environment, and life. However, there is little consensus on the style of tectonics in operation on the early Earth, and how it has changed through time. The 2017 IPRCC training course addressed when and how the continental lithosphere was generated,

when plate tectonics may have begun, the volume of continental lithosphere through Earth history, and whether it provides a representative record of Earth process. Furthermore, geophysical modelling of the thermochemical structure of the mantle in a petrologically internally-consistent manner emphasized that modeling one data type on its own is of very limited value and can lead to highly erroneous conclusions about the physical parameters of the Earth's mantle.

In order to help young Chinese geologists to have a better understanding of the most important and cutting-edge progress in recent geological research, and to promote international cooperation between Chinese and foreign geologists, the IPRCC has organized 9 short training courses on different topics since 2010. Several world-famous specialists were invited to China as lecturers for the course every year. This series of courses has already become one of the most representative academic activities organized by IPRCC and are very popular among university students and young geologists.

Figure 9.1.6. Group photo of the IPRCC 2017 International Short Course.

The IPRCC 2017 Field Trip to the Three Gorges, Yichang

The IPRCC 2017 Field Trip to the Three Gorges, Yichang, Hubei Province was organized by the core members of IPRCC, Prof. Zhang Shihong from China University of Geosicences (Beijing) on 30 October to 2 November, 2017. More than 20 geologists and university students from Germany, the USA, Australia and China participated in the field trip.

The trip was mainly on the Precambrian geological evolution of the South China Craton with specification in the formation and evolution of the Kongling Complex, the Mesoproterozoic to Neoproterozoic sedimentary rocks and the Ediacaran biota. The group visited the Miaowan ophiolite (~1.1 Ga), Huangling granite (~840 Ma), and Xiaofeng dyke swarm (~820 Ma) that may be related to the assembly and break-up of Rodinia, respectively. The group also visited the Neoproterozoic successions including Liantuo Fm. (780 -720 Ma), Nantuo Fm. (650-635 Ma), and Doushantuo Fm. (635 - 551 Ma), including the well-dated cap carbonate and the Dengying Fm. (551-542 Ma), which contains typical Ediacaran biota.

Figure 9.1.7. Group photo of the IPRCC 2017 Field Trip

9.2 Other Academic Activities

The 2017 Academic Workshop of the Institute of Geology was held on 29-30 January 2018

In order to exchange and discuss the scientific and technological results obtained in 2017, the Institute of Geology held the 2017 Academic Workshop on 29-30 January 2018. About 100 researchers and postgraduate students, including leaders of the Institute, attended the workshop.

The Workshop fell into two parts: in the first part, Academicians YANG Wencai, YANG Jingsui, and HOU Zengqian, Senior research fellows LIU Fulai, WAN Yusheng, and LIU Yongqing, made invited speeches, presenting their research achievements; and in the second part, 20 young talents of the institute, such as YANG Zhiming, ZHAI Qingguo, LIU Chaohui, Marie-Luce CHEVALIER, and so on, were invited to deliver special reports concerning different research focuses, such as the Qinghai-Tibet Plateau, the Central Asian Orogenic Belt, Isotope geochemistry, Geophysics, Precambrian geology, paleontology, and so on. Their presentations showed the great progress they had made. The older generation of geologists made comments and suggestions on the presentations delivered by the young talents, helping them to go further in their research work.

The Workshop was a great success and facilitated exchange and discussion of ideas and promoted the research capabilities of the Institute. The annual academic workshop has become a brand activity of the institute, which is not only involved with the older generation of geologists' devotion to China's geology, but also provides a platform for academic exchanges among the young geologists.

Figure 9.2.1. Researchers and students attending the Workshop.

Figure 9.2.2. WAN Yusheng gives a presentation.

Figure 9.2.3. ZHAI Qingguo gives a presentation.

Figure 9.2.4. GAO Rui makes comments on one of the presentations.

Scientific and technological talent

Since its establishment, the Institute of Geology has attracted top scientific and technological talent, including 20 academicians of the Chinese Academy of Sciences, including Huang Jiqing, Xie Jiarong, Sun Yunzhu, Cheng Yuqi, Li Chunyu, etc. At present, the Institute has 252 staff, including 7 academicians of the Chinese Academy of Sciences and 130 senior researchers.

It has a group of young subject leaders prominent both at home and abroad. Among them, 70 have won many important geoscience prizes in China or gained funding from major national authorities: 3 have won HO LEUNG HO LEE Prizes; 5 have won J. S. LEE Geoscience Prizes; 2 have won the title of J. S. LEE Scholar; 3 have won the title of Huang Jiqing Scholar; 5 are funded as National Distinguished Young Scholars; 2 as National Excellent Young Scholars; 5 as Hundred, Thousand, Ten-Thousand Talents; 4 as National Outstanding Young Experts; and 1by the China Thousand Talent Program. A group within the institute has been identified as an "Innovative Research Group" by the National Natural Science Foundation of China. By clarifying its mission, accurately defining its functions, and maintaining its innovative advantage, the Institute of Geology has made outstanding achievements in the establishment a scientific and technological talent team and in geosurveying and geoscience research, and plays a leading role among the scientific institutes affiliated to the Ministry of Land and Resources of China.

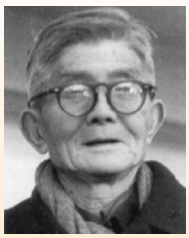
Talent program

The Institute of Geology has formulated the Scientific Talent Development Plan Outline and a number of plans that comprehensively promote the establishment of talent teams. It has collected funds to develop a series of talent training and employment programs, with a view to attracting and developing talent at home and abroad, both within and outside the Institute. These programs include the Huang Jiqing Scholars Program, Huang Jiqing Youth Recruitment Program, the Young Scholars Overseas Training Program of the Institute of Geology, and the Overseas Visiting Scholars Training Program of the Institute of Geology

Academician of Chinese Academy of Sciences


Academician Huang Jiqing

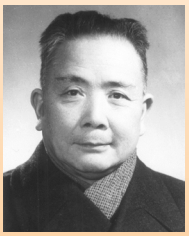

Academician Xie Jiarong

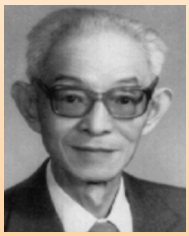

Academician Sun Yunzhu


Academician Xu Jie


Academician Cheng Yuqi


Academician Wang Yuelun


Academician Wang Hengsheng


Academician Zhu Xia

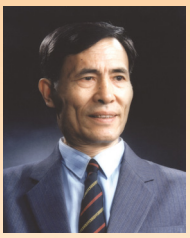

Academician Li Chunyu


Academician Xu Ren


Academician Guo Wenkui


Academician Shen Qihan


Academician Xiao Xuchang


Academician Li Tingdong


Academician Ren Jishun


Academician Xu Zhiqin


Academician Yang Wencai


Academician Gao Rui


Academician Yang Jingsui


Academician Hou Zengqian

Winner of successive Li Siguang Geological Science Awards


Xu Zhiqin


Xiao Xuchang


Ren Jishun


Ji Qiang

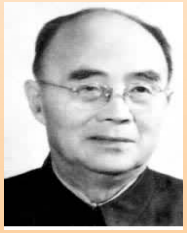

Liu Dunyi


Yang Jingsui


Hou Zengqian


Liu Fulai

Winners of HLHL Prize


Huang Jiqing


Xiao Xuchang


Xu Zhiqin


Yang Jingsui

Winner of successive National Science Fund for Distinguished Young Scholars


Ji Qiang


Zhu Xiangkun


Hou Zengqian


Liu Fulai


Zeng Lingsen

Winner of successive National Science Fund for Excellent Young Scholars


Zhi Mingguo


Liu Chaohui

Winner of successive National Millions of Talent Projects National


Hou Zengqian


Ji Qiang


Zhang Jianxian


Liu Fulai


Li Haibing


Zeng Lingsen

Excellent, distinguished and outstanding talents from Geological Survey


Li Haibing


Liu Fulai


Ding Xiaozhong


Liu Yongqing


Liu Chaohui

Graduate education

The Institute of Geology is one of the first academic institutions qualified to confer doctoral and master's degrees and provide postdoctoral research positions. It has 2 first-level doctoral degree programs, 8 doctoral degree programs, 11 master's degree programs, and 2 mobile postdoctoral centers. It has a teaching faculty of 41 doctoral student advisers and 41 advisers to candidates for a master's degree in the academic fields of tectonic geology, mineral rock mineralogy, paleontology, geophysics, geochemistry, and other geoscience fields. In 2016, it was selected as a "Demonstration Base for Cultivation of Innovative Talents" by The Ministry of Science and Technology of China As of now, there have been 60 in reading doctoral candidates and 53 postgraduates.

In June 2017, Ji Lei, Yu Xingxing, Wang Yaying, Zheng Jianbin, Cao Guangyue, Li Linlin, Zhang Fan, Chen Weiwei, Tang Wenkun, Hou Yandong, Bai Mingkun, Xu Tairan, Liu Mingqi, Wang Chaoyang won the title of "Merit Student of Chinese Academy of Geological Sciences", Chen Weiwei won the title of "Excellent Graduate of Chinese Academy of Geological Sciences", Ma Shiwei, Yu Zhuoying won "Cheng Yuqi Excellent Graduate Award", and Hou Yandong won "Cheng Yuqi Excellent Paper Award".


证 书

中国地质科学院地质研究所：

入选为创新人才推进计划—创新人才培养示范基地，特发此证。

中华人民共和国科学技术部

第 2015RA5028 号　　2016 年 5 月 16 日

Graduate field practice teaching

Graduates went to the Geological Museum of China for visiting and learning

11.1 Profile of popular science

At present, the popular science work of the Institute of Geology is under the administration of the science and technology division, and the contents of popular science are completed by scientific research personnel in part time. The Institute of Geology carries out popular science propaganda by means of venues and facilities from the national scientific and technological resource sharing platforms of Beijing SHRIMP Center, Key Laboratory of Stratigraphy and Palaeontology, Ministry of Land and Resources, State Key Laboratory of Continental Dynamic, Ministry of Land and Resources, and meanwhile carries out propaganda by picture bulletin board, specimen exhibition and electronic signs, etc. in the corridors of the office building. In 2017, two popular science activities were held, the popular science expenses were CNY 3,000, the direct audiences of the popular science are 62 persons-time, the real-time audience visits of live broadcast online were 28,000 persons-time, two popular science monographs and two popular science papers were published, three popular science books won "Excellent Popular Science Book of the Ministry of Land and Resources in 2017", and two persons won the title of "First Batch of Chief Science Communication Experts of Land and Resources"

11.2 Highlights of popular science

11.2.1. Activities on Earth Day

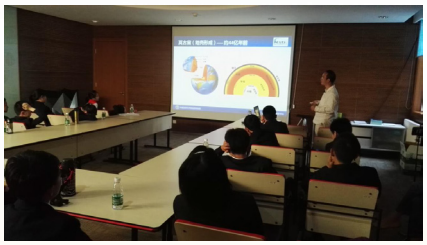


Figure 11.2.1 Popular Science Lecture on "Birth and Growth of Mother Earth"

Figure 11.2.2. Professor Ian Williams and Doctor Stephen Clement Introduced the Working Principle of SHRIMP Instrument to Students

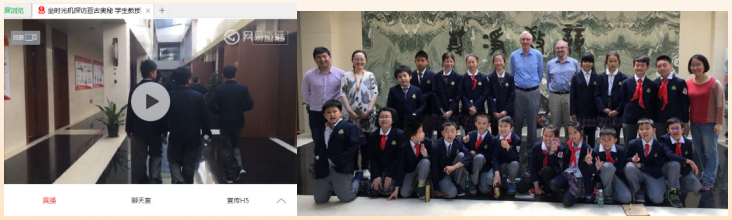


Figure 11.2.3. Live telecast at Netease (left), Group Photo of Teachers, Students of Peking University Elementary School and Laboratory Staff (right)

Figure 11.2.4. Popular Science Lecture of "Puzzle of Oviraptor Stealing An Egg"

11.2.2 Two published popular science books

Figure 11.2.5. *The Beauty of Geology: The Classic Landform by Su Dechen & Sun Aiping and The Shennongjia-Meso-Neoproterozoic Proterozoic Sedimentary Geological Landscape by Liu Yongqing and Kuang Hongwei, et al.*

11.2.3 Three popular science books won "2017 Excellent Popular Science Books of the Ministry of Land and Resources".

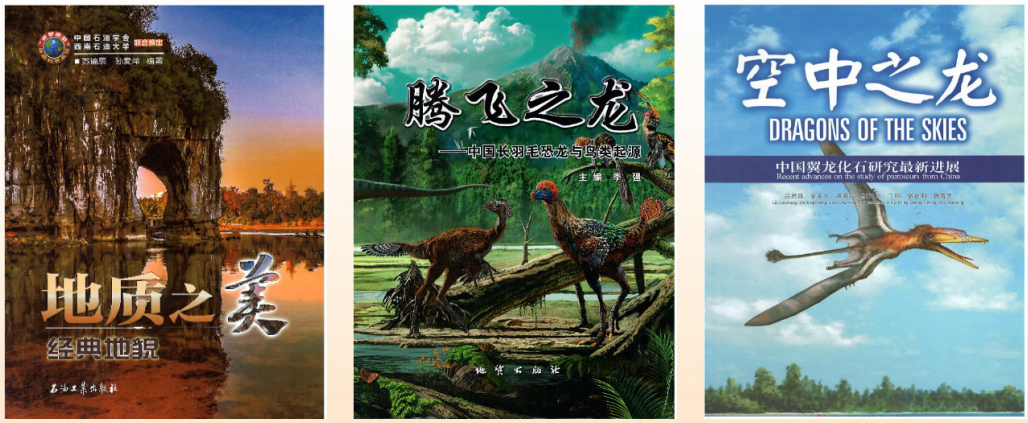


Figure 11.2.6. 1) *The Beauty of Geology: The Classic Landform* by Su Dechen & Sun Aiping; 2) *The Dragon of Ascension - Origins of Chinese Feathered Dinosaurs and Birds* by Ji Qiang and Wang Xuri, et al.; 3) *The Dragon in the Air - The Latest Progress in Chinese Pterosaur Fossil Research* by Lv Junchang, Jin Xingsheng, et al.

11.2.4 Two published papers on popular science

生命史话

正在孵蛋的中华贝贝龙（赵闯 绘制）

中华贝贝龙：
即将破壳的巨无霸

吕君昌

海外盗掘 20 年后，中华贝贝龙，这件轰动世界的 8 600 万年前的恐龙胚胎和蛋化石标本，终于回到中国。它的发现，不仅增加了窃蛋龙的新种类，而且为了解窃蛋龙类的个体发育提供了重要线索。

扫一扫
手机阅读更方便

48

特别关注，小小苔藓 精彩世界

江西平乡早出现世界植物化石

浅谈苔藓化石

郭彩清[1] 吴鹏程[2]

如果你留心观察，就会发现身边很多地方都有苔藓植物的身影。花坛里、果养卷子处、砖块缝隙间、湖泊浅水旁……其实苔藓是一类非常古老的植物，很早以前就出现在地球上并繁衍至今。那么世界上最古老的苔藓植物是何时出现的？苔藓植物化石又是怎样形成的？我们研究苔藓化石又有哪些用途？

苔藓是苔类、藓类和角苔类植物的总称，全球约 2.5 万种，它们是植物界的重要组成部分，也是植物由水生向陆生的过渡类群。其种类繁多，分布广泛，从赤道到南北极均有分布。苔藓的历史也非常悠久，这一点可从化石中得到验证。不过，保存为化石的种类和数量非常稀少。该类化石的研究对于探索陆地植物起源及演化具有十分重要的意义。

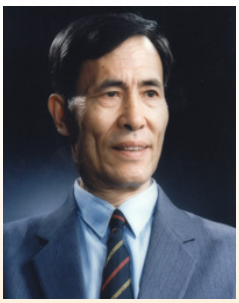
世界上最古老的苔藓

苔藓化石是地质历史时期生活的苔藓植物被迅速掩埋后经过长期的石化作用形成的。与其他陆生维管植物相比，苔藓的个体比较小且柔弱，从肉眼不可见至株高几十厘米不等；结构也相对简单，配子体表面没有角质层，没有真正的根和维管组织，假根由单个或单列细胞组成。苔类植物的配子体造型有两种类型，茎、叶不分化的叶状体，有类似茎、叶分化的拟茎叶体。叶片由单层或多层细胞构成。藓类植物的配子体为有茎、叶分化的茎叶体。蕨中的（中蕨类似其他高等植物的主叶脉，苔藓植物分无中蕨、单条中蕨三种情况。中蕨结构比较简单，内部无维管束组织，仅由几层细胞组成）区域外，叶片均由单层细胞构成。这些特点导致苔藓植物在形成

16

Figure 11.2.7. *Chinese Babylon: The Upcoming Shelled Giant by* Lv Junchang and *Discussion on the Mossy Fossil* by Guo Caiqing

11.2.4 Two experts were recruited as the first batch of chief science communication experts of land and resources.



Li Tingdong
Academician

Su Dechen
Research Fellow

12.1 English language publications:

Kou Caihua, Zhang Zhaochong, M. Santosh, Huang He, Zhu Jiang. 2017. Oldest volcanic-hosted submarine iron ores in South China: Evidence from zircon U–Pb geochronology and geochemistry of the Paleoproterozoic Dahongshan iron deposit. Gondwana Research, 49: 182-204.

Tian Fei, Wang Yong, Liu Jin, Tang Wenkun, Jiang Nan. 2017. Late Holocene climate change inferred from a lacustrine sedimentary sequence in southern Inner Mongolia, China. Quaternary International, 452: 22-32.

Tian Fei, Wang Yong, Chi Zhenqing, Liu Jin, Yang Huijun, Jiang Nan, Tang Wenkun. 2017. Late Quaternary vegetation and climate reconstruction based on pollen data from southeastern Inner Mongolia, China. Review of Palaeobotany & Palynology, 242: 33-42.

Liu Jin, Wang Yang, Wang Yong, Guan Youyi, Dong Jin, Li Tingdong. 2017.A multi-proxy record of environmental changes during the Holocene from the Haolaihure Paleolake sediments, Inner Mongolia. Quaternary International: 1-12.

Zhang Beihang, Zhang Jin, Wang Yannan, Zhao Heng, Li Yanfeng. 2017. Late Mesozoic-Cenozoic Evolution of the northern Hexi Corridor: constrained by apatite fission track ages of the Longshoushan. Acta Geologica Sinica (English Edition), 91(5): 1624-1643.

Zhang Yiping, Zhang Jin, Chen Xuanhua, Wang Yannan, Zhao Heng, Nie Fengjun, Zhang Beihang. 2017. Late Paleozoic tectonic setting of the southern Alxa Block, NW China: constrained by age and composition of diabase. International Geological Review, 59(8): 1028-1046.

Zhang Jin, Qu Junfeng, Zhang Beihang, Zhao Heng, Wang Yannan, Lu Miaoan. 2017. Paleozoic to Mesozoic deformation of eastern Cathaysia, a case study of Chencai Complex, Zhejiang Province, eastern China and its tectonic implications. GSA Bulletin, https: //doi.org/10.1130/B31680.1.

Wang Yannan, Zhang Jin, Zhang Beihang, Zhao Heng. 2017.Cenozoic exhumation history of South China: a case study from the Xuefeng Mt. Range.Journal of Asian Earth Sciences, https: //doi.org/10.1016/j.jseaes.2017.10.039.

Zheng Rongguo, Li Jinyi, Xiao Wenjiao, Zhang Jin. 2017.Nature and provenance of the Beishan Complex, southernmost Central Asian Orogenic Belt. International Journal of Earth Science, doi: 10.1007/s00531.017.1525.2.

Li Shan, Chung Sunlin, S. A. Wilde, Bor-ming Jahn, Xiao Wenjiao, Wang Tao, Guo Qianqian. 2017. Early-Middle Triassic high Sr/Y granitoids in the southern Central Asian Orogenic Belt: implications for ocean closure in accretionary orogens. Journal of Geophysical Research: Solid Earth, 122(3): 2291-2309.

Li Shan, Chung Sunlin, Wang Tao, S. A. Wilde, Chu Mei-fei, Guo Qianqian. 2017. Tectonic significance and geodynamic processes of large-scale Early Cretaceous granitoid magmatic events in the southern Great Xing'an Range, North China. Tectonics, 36(4): 615-633.

Li Shan, Wang Tao, Xiao Wenjiao, Chung Sunlin, S. A. Wilde. 2017. Triassic terminal magmatism in the southern Central Asian Orogenic Belt: implications for ocean closure in accretionary orogens. Geodynamics & Tectonophysics, 8 (3): 507–508.

Li Shan, Chung Sunlin, Wang Tao, S. A. Wilde, Chu Meifei, Pang Chongjin, Guo Qianqian. 2017. Water-fluxed crustal melting and petrogenesis of large-scale Early Cretaceous intracontinental granitoids in the southern Great Xing'an Range, North China. GSA Bulletin, https: //doi.org/10.1130/B31771.1.

Zhai Qingguo, Bor-ming Jahn, Li Xianhua, Zhang Ruyuan, Li Qiuli, Yang Ya-nan, Wang Jun, Liu Tong, Hu Peiyuan, Tang Suohan. 2017. Zircon U–Pb dating of eclogite from the Qiangtang terrane, north-central Tibet: a case of metamorphic zircon with magmatic geochemical features. International Journal of Earth Sciences, 106, 1239-1255.

Hu Peiyuan, Zhai Qingguo, Bor-ming Jahn, Wang Jun, Li Cai, Chung Sunlin, Lee Haoyang, Tang Suohan. 2017. Late Early Cretaceous magmatic rocks (118–113 Ma) in the middle segment of the Bangong–Nujiang suture zone, Tibetan Plateau: evidence of lithospheric delamination. Gondwana Research, 44: 116-138.

Hu Peiyuan, Zhai Qingguo, Wang Jun, Tang Yue, Ren Guangming. 2017. The Shimian ophiolite in the western Yangtze Block, SW China: Zircon SHRIMP U-Pb ages, geochemical and Hf-O isotopic characteristics, and tectonic implications. Precambrian Research, 298: 107-122.

Zhai Qingguo, Wang Jun, Hu Peiyuan, Lee Haoyang, Tang Yue, Wang Haitao, Tang Suohan, Chung Sunlin. 2017. Late Paleozoic granitoids from central Qiangtang, northern Tibetan plateau: a record of Paleo-Tethys Ocean subduction. Journal of Asian Earth Sciences, http: //dx.doi.org/10.1016/j.jseaes.2017.07.030.

Hu Peiyuan, Zhai Qingguo, Ren Guangming, Wang Jun, Tang Yue. 2017. Late Ordovician high-Mg adakitic andesite in the western South China block: evidence of oceanic subduction. International Geology Review, http: //dx.doi.org/10.1080/00206814.2017.1370617.

Zhu Junbin, Ren Jishun. 2017. Carboniferous-Permian stratigraphy and sedimentary environment of southeastern Inner Mongolia,

China: Constraints on final closure of the Paleo-Asian Ocean. Acta Geologica Sinica (English Edition), 91(3): 832-856.

Song Yanyan, Yu Shenyang, Zhang Yuandong, Sun Xiaowen, L. A. Muir, Liu Pengju. 2017. Reconstruction of a shallow intraplatform depression by microfacies analysis of the Upper Ordovician Miaopo and Datianba formations in the northwestern Yangtze Region, China. Palaeoworld, http: //dx.doi.org/10.1016/j.palwor.2017.03.003.

Bo Jingang, Wang Xunlian, Gao Jinhan, YaoJianxin, Wang Genhou, Hou Engang. 2017. Upper Triassic reef coral fauna in the Renacuo area, northern Tibet, and its implications for palaeobiogeography. Journal of Asian Earth Sciences, 146: 114-133.

Bo Jingfang, Yao Jianxin, Liao Weihua, Deng Zhanqiu. 2017. Triassic scleractinian corals in China: A review of present knowledge. Acta Geologica Sinica (English Edition), 91(1): 271–282.

Jin Xiaochi, Xiao Wenjiao. 2017. Development of the Asian Tethyan Realm. International Journal of Earth Sciences, 106: 1177–1180.

Wang Xuri, Wang Long, Ji Qiang. 2017. First discovered diversified fossil locality of the Jehol Biota in the Greater Khingan Mountains, Inner Mongolia. Acta Geologica Sinica (English Edition), 91(5): 1906-1907.

Guo Caiqing, Yao Jianxin, Zhang Jianwei, Wu Pengcheng, Li Chengsen. 2017. New fossil liverworts from the Lower Cretaceous of Western Liaoning, China. Acta Geologica Sinica(English edition), 91(5): 1542-1552.

Guo Caiqing, Yao Jianxin. 2017. New Discovery of Reproductive Organs and Spores in Situ of Ginkgoales and Czekanowskiales from the Middle Jurassic of Shaanxi, China. Acta Geologica Sinica (English Edition), 91(6): 2314-2315.

Huang Hao Shi Yukun, Jin Xiaochi. 2017. Permian (Guadalupian) fusulinids of Bawei Section in Baoshan Block, western Yunnan, China: Biostratigraphy, facies distribution and paleogeographic discussion. Palaeoworld, 26(1): 95-114.

Huang Hao, Jin Xiaochi, Li Fei, Shen Yang. 2017. Permian oolitic carbonates from the Baoshan Block in western Yunnan, China, and their paleoclimatic and paleogeographic significance. International Journal of Earth Sciences, 106(4): 1341-1358.

Lv Junchang, Li Guoqing, M. Kundrát, Yuong-Nam Lee, Sun Zhenyuan, Yoshitsugu Kobayashi, Shen Caizhi, Teng Fangfang, Liu Hanfeng. 2017. High diversity of the Ganzhou Oviraptorid Fauna increased by a new “cassowary-like” crested species. Scientific Reports, 113

Pu Hanyong, D. K. Zelenitsky, Lv Junchang, P. J. Currie, K. Carpenter, Li Xu, E. B. Koppelhus, Jia Songhai, Xiao Le, Chuang Huali, Li Tianran, M. Kundra′t, Shen Caizhi. 2017. Perinate and eggs of a giant caenagnathid dinosaur from the Late Cretaceous of central China. Nature Communication, 1-9.

Hou Yandong, Zhang Lifu, Jiang Shan, Ji Shu’an. 2017. Sauropod teeth from the Lower Cretaceous Luohandong Formation of Ordos Basin, Inner Mongolia. Acta Geologica Sinica (English Edition), 91(3): 791-796.

Ji Shu’an, Zhang Lifu, Lu Liwu, Hao Jianqiang. 2017. The first discovery of the Late Cretaceous protoceratopsid fauna from Alxa, Inner Mongolia, China. Acta Geologica Sinica (English Edition), 91(5): 1908-1909.

Liu Fulai, Liu Chaohui, I. Keita, I. Tsuyoshi, Cai Jia, Wang Fang. 2017. Geochemistry, U-Pb dating, and Lu-Hf isotopes of zircon and monazite of porphyritic granites within the Jiao-Liao-Ji orogenic belt: Implications for petrogenesis and tectonic setting. Precambrian Research, 300: 78-106.

Liu Fulai, Liu Lishuang, Cai Jia, Liu Pinghua, Wang Fang, Liu Chaohui, Liu Jianhui. 2017. A widespread Paleoproterozoic partial melting event within the Jiao-Liao-Ji Belt, North China Craton: Zircon U-Pb dating of granitic leucosomes within pelitic granulites and its tectonic implications. Precambrian Research, https: //doi.org/10.1016/j.precamres.2017.10.017.

Liu Fulai, Liu Lishuang, Liu Pinghua, Wang Fang, Cai Jia, Liu Jianhui, Wang Wei, Ji Lei. 2017. A relic slice of Archean–early Paleoproterozoic basement of Jiaobei Terrane identified within the Sulu UHP belt: Evidence from protolith and metamorphic ages from meta-mafic rocks, TTG–granitic gneisses, and metasedimentary rocks in the Haiyangsuo region. Precambrian Research, 303: 117-152.

Du Lilin, Yang Chonghui, D. A.Wyman, A. P. Nutman, Zhao Lei, Lu Zenglong, Song Huixia, Geng Yuansheng, Ren Liudong. 2017. Zircon U-Pb ages and Lu-Hf isotope compositions from clastic rocks in the Hutuo Group: Further constraints on Paleoproterozoic tectonic evolution of the Trans-North China Orogen. Precambrian Research, 303: 291-314.

Wang Wei, Zhang Xin, Wang Shijin, M. Santosh. 2017. Geochronology and geochemistry of Neoarchean granitoids from the western Shandong Province, North China Craton, implications for crustal evolution and cratonization. Precambrian Research, 303: 749-763.

Cai Jia, Liu Fulai, Liu Pinghua, Wang Fang, Meng En, Wang Wei, Yang Hong, Ji Lei, Liu Lishuang. 2017. Discovery of granulite-facies metamorphic rocks in the Ji’an area, northeastern Jiao–Liao–Ji Belt, North China Craton: metamorphic P–T evolution and geological implications. Precambrian Research, 303: 626-640.

Cai Jia, Liu Fulai, Liu Pinghua. 2017. Paleoproterozoic multistage metamorphic events in Jining metapeliti crocks from the Khondalite Belt in the North China Craton: Evidence from petrology, phase equilibria modelling and U–Pb geochronology. Journal of Asian Earth Sciences, 138: 515–534.

Cai Jia, Liu Fulai, Liu Pinghua, Wang Fang, Liu Chaohui, Shi Jianrong. 2017. Anatectic record and P–T path evolution of metapelites from the Wulashan Complex, Khondalite Belt, North China Craton. Precambrian Research, 303: 10-29.

Zhang Wen, V. Pease, Meng Qingpeng, Zheng Rongguo, Wu Tairan. 2017. Age and petrogenesis of late Paleozoic granites from the northernmost Alxa region, northwest China, and implications for the tectonic evolution of the region. International Journal of Earth Sciences, 106 (1): 79-96.

Zhang Wen, V.Pease, Meng Qingpeng, Zheng Rongguo, Wu Tairan. 2017. Age and petrogenesis of Mingshui-Shuangjingzi granites from the northern Beishan area, northwest China, and their implications for tectonic evolution. Geosciences Journal, 21 (5): 667-682.

Tian Zhonghua, Xiao Wenjiao, B. F. Windley, Zhang Ji'en, Zhang Zhiyong, Song Dongfang. 2017. Carboniferous rifted arcs leading to an archipelago of multiple arcs in the Beishan–Tianshan orogenic collages (NW China). International Journal of Earth Science, 106: 2319-2342.

Liu Pinghua, Liu Fulai, Cai Jia, Liu Chaohui, Liu Jianhui, Wang Fang, Xiao Lingling, Shi Jianrong. 2017. Spatial distribution, P–T–t paths, and tectonic significance of high-pressure mafic granulites from the Daqingshan–Wulashan Complex in the Khondalite Belt,North China Craton.Precambrian Research,303: 687-708.

Liu Pinghua, Liu Fulai, Cai Jia, Wang Fang, Liu Chaohui, Liu Jianhui, Shi Jianrong, Liu Lishuang. 2017. Discovery and geological significance of high-pressure mafic granulites in the Pingdu–Anqiu area of the Jiaobei Terrane, the Jiao–Liao–Ji Belt, the North China Craton. Precambrian Research, 303: 445-469.

Liu Jianhui, Liu Fulai, Ding Zhengjiang, Liu Pinghua, Wang Fang, Yang Hong, Cai Jia, Shi Jianrong. 2017. Petrogenesis and tectonic implications of the charnockites in the Yishui Terrane, North China Craton. Precambrian Research, 303: 315-331.

Liu Jianhui, Liu Fulai, Ding Zhengjiang, Liu Pinghua, Chen Junqiang, Liu Chaohui, Wang Fang, Yang Hong, Cai Jia, Shi Jianrong. 2017. Late Neoarchean–Paleoproterozoic arc-continent accretion along the Khondalite Belt, Western Block, North China Craton: Insights from granitoid rocks of the Daqingshan–Wulashan area. Precambrian Research, 303: 494-519.

Liu Chaohui, Zhao Guochun, Liu Fulai, Shi Jianrong. 2017. Detrital zircon U-Pb and Hf isotopic and whole-rock geochemical study of the Bayan Obo Group, northern margin of the North China Craton: Implications for Rodinia reconstruction. Precambrian Research, 303: 372-391.

Liu Chaohui, Zhao Guochun, Liu Fulai, Shi Jianrong. 2017. Late Precambrian tectonic affinity of the Alxa block and the North China Craton: Evidence from zircon U-Pb dating and Lu-Hf isotopes of the Langshan Group. Precambrian Research, https: // doi.org/10.1016/j.precamres.2017.10.019.

Tian Zhonghua, Liu Fulai, B. F. Windley, Liu,Pinghua, Wang Fang, Liu Chaohui, Wang Wei, Cai Jia, XiaoWenjiao. 2017. Polyphase structural deformation of low- to medium-grade metamorphic rocks of the Liaohe Group in the Jiao-Liao-Ji Orogenic Belt, North China Craton: Correlations with tectonic evolution. Precambrian Research, 303: 641-659.

Zhao Lei, Zhai Mingguo, M.Santosh, Zhou Xiwen. 2017. Early Mesozoic retrograded eclogite and mafic granulite from the Badu Complex of the Cathaysia Block, South China: Petrology and tectonic implications. Gondwana Research, 42: 84-103.

Wang Fang, Liu Fulai, Liu Pinghua, Cai Jia, H.P. Schertl, Ji Lei, Liu Lishuang, Tian Zhonghua. 2017. In situ zircon U-Pb dating and whole-rock geochemistry of metasedimentary rocks from South Liaohe Group, Jiao-Liao-Ji orogenic belt: Constraints on the depositional and metamorphic ages, and implications for tectonic setting. Precambrian Research, 303: 764-780.

Lian Dongyang, Yang Jingsui, Y. Dilek, Liu Fei, Wu Weiwei, Xiong Fahui. 2017. Geochemical, Geochronological, and Sr-Nd Isotopic Constraints on the Origin of the Mafic Dikes from the Pozanti-Karsanti Ophiolite: Implications for Tectonic Evolution. The Journal of Geology, 125(2): 223-239.

Lian Dongyang, Yang Jingsui, Liu Fei, Wu Weiwei, Zhang Li, Zhao Hui, HuanJiang. 2017. Geochemistry and tectonic significance of the Gongzhu peridotites in the northern branch of the western Yarlung Zangbo ophiolitic belt, Western Tibet. Mineralogy and Petrology, 1-18.

Lian Dongyang, Yang Jingsui, Y. Dilek, Wu Weiwei, Zhang Zhongming, Xiong Fahui, Liu Fei, Zhou Wenda. 2017. Deep mantle origin and ultra-reducing conditions in podiform chromitite: Diamond, moissanite, and other unusual minerals in podiform chromitites from the Pozanti-Karsanti ophiolite, southern Turkey. American Mineralogist, 102: 1101-1113.

Wu Cailai, Dong Shuwen, Wu Di, Zhang Xin, W.G. Ernst. 2017. Late Mesozoic high-K calc-alkaline magmatism in SE China: The Tongling Example. International Geology Review, http: // dx.doi.org/ 10.1080/ 00206814. 2017.1313 137.

Yuan Tingyuan, Wu Liandong, Liu Yan, Li Huaqi. 2017. Rodinian granulites from southern Qiangtang terrane: Implications for tectonic evolution of the Tibetan Plateau. Solid Earth Sciences, 2: 10-22.

Zhang Cong, T. Bader, Zhang Lifei, H. van Roermund. 2017. The multi-stage tectonic evolution of the Xitieshan terrane, North Qaidam orogen, western China: From Grenville-age orogeny to early-Paleozoic ultrahigh-pressure metamorphism. Gondwana Research, 41: 290-300.

Wu Weiwei, Yang Jingsui, Ma Changqian, M.Ibrahim, Lian Dongyang, Tian Yazhou. 2017. Discovery and Significance of Diamonds and Moissanites in Chromitite within the Skenderbeu Massif of the Mirdita Zone Ophiolite, West Albania. Acta Geologica Sinica(English Edition), 91(3): 882-897.

Niu Xiaolu, Chen Bin, Feng Guangying, Liu Fei, Yang Jingsui. 2017. Origin of Lamprophyres from the northern margin of the North China Craton: implications for mantle metasomatism. Journal of the Geological Society, 174: 353-364.

Xiong Fahui, Yang Jingsui, P.T. Robinson, Xu Xiangzhen, Liu Zhao, Zhou Wenda, Feng Guangying, Xu Jifeng, Li Jie, Niu Xiaolu. 2017. High-Al and high-Cr podiformchromitites from the western Yarlung-Zangbo suture zone, Tibet: Implications from mineralogy and geochemistry of chromian spinel, and platinum-group elements. Ore Geology Reviews, 80: 1020-1041.

Xiong Fahui, Yang Jingsui, P. T. Robinson, Gao Jian, Chen Yanhong, Lai Shengming. 2017. Petrology and geochemistry of peridotites and podiform chromitite in the Xigaze ophiolite, Tibet: Implications for a suprasubduction zone origin. Journal of Asian Earth Sciences, 146: 56-75.

Xiong Fahui, Yang Jingsui, Y. Dilek, Xu Xiangzhen, Zhang Zhongming. 2017. Origin and Significance of Diamonds and Other Exotic Minerals in the Dingqing Ophiolite Peridotites, Eastern Bangong-Nujiang Suture Zone, Tibet. Lithosphere, DOI: 10.1130/L607.1.

Xiong Fahui, Yang Jingsui, Y. Dilek, Wang Chunlian. 2017. Nanoscale diopside and spinel exsolution in olivine from dunite of the Tethyan ophiolites, Southwestern Turkey: Implications for the multi-stage process. Journal of Nanoscience and Nanotechnology, 17(9): 6587–6596.

Xiong Fahui, Yang Jingsui, P.T.Robinson, Y.Dilek, I. Milushi, Xu Xiangzhen, Zhou Wenda, Zhang Zhongming, Rong He. 2017. Diamonds discovered from High-Cr podiform chromitites of Bulqiza, Eastern Mirdita Ophiolite (EMO), Albania. Acta geologica sinica (English edition), 91(2): 455-468.

Jia Lihui, Meng Fancong, Feng Huibin. 2017. The Wenquan ultramafic rocks in the Central East Kunlun Fault zone Qinghai-Tibet Plateau—crustal relics of the Paleo-Tethys ocean. Mineral and Petrology, doi: 10.1007/s00710-017-0544-9.

Gao Li'e, Zeng Lingsen, P.D.Asimow.2017. Contrasting geochemical signatures of fluid-absent versus fluid-fluxed melting of muscovite in metasedimentary sources: The Himalayan leucogranites. Geology, 45(1): 39–42.

Wang Yuhua, Zeng Lingsen, Gao Li'e, Guo Chunli, Hou Kejun, Zhang Lifei, Wang Wei, Sun Huiyi. 2017. Neoproterozoic magmatism in eastern Himalayan Terrane. Science Bulletin, 62: 415–424.

Han Jianguang, Wang Yun. 2017. A method of directly extracting multiwave angle-domain common-image gathers. Acta Geophysics, 65: 1009-1017.

Han Jianguang, Wang Yun, Yu Changqing, Chen Peng. 2017. Angle-domain common-image gathers from anisotropic Gaussian beam migration and its application to anisotropy-induced imaging errors analysis. Journal of Earth System Science, 126(10): doi. 10.1007/s12040-016-0783-x

Li Huaqi, Xu Zhiqin, A. A. G.Webb, Li Tianfu, Ma Shiwei, Huang Xuemeng. 2017. Early Jurassic tectonism occurred within the Basu metamorphic complex, eastern central Tibet: implications for an archipelago-accretion orogenic model. Tectonophysics, 702: 29-41.

Ma Xuxuan, Xu Zhiqin, J. G. Meert. 2017. Syn-convergence extension in the southern Lhasa terrane: Evidence from late Cretaceous adakitic granodiorite and coeval gabbroic-dioritic dykes. Journal of Geodynamics, 110: 12-30.

Ma Xuxuan, J. G. Meert, Xu Zhiqin, Zhao Zhongbao. 2017. Evidence of magma mixing identified in the Early Eocene Caina pluton from the Gangdese Batholith, south Tibet. Lithos, 278-281: 126-139.

Ma Xuxuan, Xu Zhiqin, J. Meert, M. Santosh. 2017. Early Jurassic intra-oceanic arc system of the Neotethys Ocean: constraints from andesites in the Gangdese magmatic belt, south Tibet. Island Arc, doi 10.1111/iar.12202.

Chen Zhijia, Tian Zuolin, Zhang Zeming, Dong Xin. 2017. Early Jurassic metamorphism of the eastern segment of the Lhasa terrane in South Tibet and its tectonic significance. International Geology Review, 59(14): 1827-1843.

Liu Mingqi, Li Zhonghai, Yang Shaohua. 2017. Diapir versus along-channel ascent of crustal material during plate convergence: Constrained by the thermal structure of subduction zones. Journal of Asian Earth Sciences, 145 Part A (1): 16-36.

Yang Shaohua, Li Zhonghai, T.Gerya, Xu Zhiqin, Shi Yaolin. 2017. Dynamics of terrane accretion during seaward continental drifting and oceanic subduction: Numerical modeling and implications for the Jurassic crustal growth of the Lhasa Terrane, Tibet. Tectonophysics, doi: 10.1016/j.tecto.2017.07.018.

Yi Zhiyu, E. Appel, Huang Baochun. 2017. Comment on "Remagnetization of the Paleogene Tibetan Himalayan carbonate rocks in the Gamba area: Implications for reconstructing the lower plate in the India Asia collision" by Huang et al. Journal of Geophysical Research: Solid Earth, 122, 4852-4858.

Zhang Jianxin, Yu Shengyao, C.G. Mattinson. 2017. Early Paleozoic polyphase metamorphism in northern Tibet, China. Gondwana Research, 41: 267–289.

Yu Shengyao, Zhang Jianxin, Li Sanzhong, Sun Deyou, Li Yunshuai, Liu Xin, Guo Lingli, Suo Yanhui, Peng Yinbiao, Zhao Xilin. 2017. Paleoproterozoic granulite-facies metamorphism and anatexis in the Oulongbuluke Block, NW China: Respond to assembly of the Columbia supercontinent. Precambrian Research, 291: 42–62.

Peng Yinbiao, Yu Shengyao, Zhang Jianxin, Li Sanzhong, Tong Laixi, Sun Deyou. 2017. Early Paleozoic arc magmatism and metamorphism in the northern Qilian Block, western China: petrological and geochronological constraints. Geological Journal, doi: 10.1002/gj.3041.

Zhao Zhongbao, P. D. Bons, K. Stuebner, Wang Genhou, T. A. Ehles. 2017. Early Cretaceous exhumation of the Qiangtang Terrane during collision with the Lhasa Terrane, Central Tibet. Terra Nova, doi: 10.1111/ter.12298.

Mao Xiaohong, Zhang Jianxin, Yu Shengyao LI Yunshuai, Yu Xingxing, Lu Zenglong. 2017. Early Paleozoic granulite-facies metamorphism and anatexis in the northern West Qinling orogen: Monazite and zircon U-Pb geochronological constraints. Science China-Earth Sciences, 60(5): 943-957.

Dong Aiguo, Zhu Xiangkun, Li Zhihong, B. Kendall, Li Shizhen, Wang Yue, Tang Chao. 2017. A multi-isotope approach towards constraining the origin of large-scale Paleoproterozoic B-(Fe) mineralization in NE China. Precambrian Research, 292: 115-129.

Li Jin, Tang Suohan, Zhu Xiangkun, Pan Chenxu. 2017. Production and Certification of the Reference Material GSB 04-3258-2015 as a 143Nd/144Nd Isotope Ratio Reference. Geostandards and Geoanalytical Research, 41(2): 255-262.

She Yuwei, Song Xieyan, Chen Liemeng, Yu Songyue, Zhu Xiangkun, Yi Jun-nian, Hu Junhao. 2017. Platinum-group element geochemistry of the layered intrusions in the Emeishan large igneous province, SW China: Implications for the principal controls on magmatic sulfide immiscibility. American Journal of Science, 317: 483-513.

Gao Zhaofu, Zhu Xiangkun, Sun Jian, Luo Zhaohua, Bao Chuang, Tang Chao, Ma Jianxiong. 2017. Spatial evolution of Zn-Fe-Pb isotopes of sphalerite within a single ore body: A case study from the Dongshengmiao ore deposit, Inner Mongolia, China. Mineralium Deposita, doi: 10.1007/s00126-017-0724-x.

Yin Jiyuan, Chen Wen, Xiao Wenjiao, Yuan Chao, Sun Min, Cai Keda. 2017. Petrogenesis and tectonic implications of early Devonian mafic dike–granite association in the northern West Junggar, NW China. International Geology Review, https: //doi.org/10.1080/00206814.2017.1323238.

Yin Jiyuan, Chen Wen, Xiao Wenjiao, Yuan Chao, Yu Shun, Sun Jingbo, Cai Keda, Long Xiaoping. 2017. The source and tectonic implications of late Carboniferous–early Permian A-type granites and dikes from the eastern Alataw Mountains, Xinjiang: geochemical and Sr–Nd–Hf isotopic constraints. International Geology Review, 59(10): 1310-1323.

Yin Jiyuan, Chen Wen, Xiao Wenjiao, Yuan Chao, Zhang Bin, Cai Keda, Long Xiaoping. 2017. Geochronology, petrogenesis and tectonic significance of the latest Devonian -early Carboniferous I-type granites in the Central Tianshan, NW China. Gondwana Research, 47: 188-199.

Yin Jiyuan, Chen Wen, Xiao Wenjiao, Yuan Chao, B.F.Windley, Yu Shun, Cai Keda. 2017. Late Silurian-early Devonian adakitic granodiorite, A-type and I-type granites in NW Junggar, NW China: Partial melting of mafic lower crust and implications for slab roll-back. Gondwana Research, 43: 55-73.

Dong Chunyan, Wan Yusheng, Xie Hangqiang, A. P. Nutman, Xie Shiwen, Liu Shoujie, Ma Mingzhu, Liu Dunyi. 2017. The Mesoarchean Tiejiashan-Gongchangling potassic granite in the Anshan-Benxi area, North China Craton: Origin by recycling of Paleo- to Eoarchean crust from U-Pb-Nd-Hf-O isotopic studies. Lithos, 290–291: 116–135.

Dong Chunyan, Xie Hangqiang, A. Kröner, Wang Shijin, Liu Shoujie, Xie Shiwen, Song Zhiyong, Ma Mingzhu, Liu Dunyi, Wan Yusheng. 2017. The complexities of zircon crystllazition and overprinting during metamorphism and anatexis: An example from the late Archean TTG terrane of western Shandong Province, China. Precambrian Research, 300: 181–200.

Shi Yuruo, Zhao Xitao. 2017. Early Neoarchean magmatic and Paleoproterozoic metamorphic events in the northern North China Craton: SHRIMP zircon dating and Hf isotopes of Archean rocks from the Miyun area, Beijing. Acta Geologica Sinica (English Edition), 91(3): 988-1002.

Shi Yuruo, Li Linlin, A. Kröner, Ding Jing, Zhang Wei, Huang Zengbao, Jian Ping. 2017. Carboniferous Alaskan-type complex along the Sino–Mongolian boundary, southern margin of the Central Asian Orogenic Belt. Acta Geochimica, 36(2): 276-290.

Li Linlin, Shi Yuruo, I. S.Williams, J. L. Anderson, Wu Zhonghai, Wang Shubing. 2017. Geochemical and zircon isotopic evidence for extensive high level crustal contamination in Miocene to mid-Pleistocene intra-plate volcanic rocks from the Tengchong field, western Yunnan, China. Lithos, 286-287: 227-240.

Xie Hangqiang, A. Kröner, G. Brandl, Wan Yusheng. 2017. Two orogenic events separated by 2.6 Ga mafic dykes in the Central Zone, Limpopo Belt, southern Africa. Precambrian Research, 289: 129-141.

A. Kröner, D.V. Alexeiev, V.P. Kovach, Y. Rojas-Agramonte, A.A. Tretyakov, A.V. Mikolaichuk, Xie Hangqiang, E.R. Sobel. 2017. Zircon ages, geochemistry and Nd isotopic systematics for the Palaeoproterozoic 2.3–1.8 Ga Kuilyu Complex, East Kyrgyzstan – The oldest continental basement fragment in the Tianshan orogenic belt. Journal of Asian Earth Sciences, 135:

122-135.

A. Kröner, V. Kovach, D. Alexeiev, Kuo-Lung Wang, JeanWong, K. Degtyarev, I. Kozakov. 2017. No excessive crustal growth in the Central Asian Orogenic Belt: Further evidence from field relationships and isotopic data. Gondwana Research, 50, 135-166.

A. Kröner, Y. Rojas-Agramonte. 2017. Mesoproterozoic (Grenville-age) granitoids and supracrustal rocks in Kaokoland, northwestern Namibia. Precambrian Research, 298: 572-592.

A. Kröner, V. Kovach, I. Kozakov, L. Aranovich, Xie Hangqiang, E. Tolmacheva, T. Kirnozova, M. Fuzgan, N. Serebryakov, Kuo-Lung Wang, Hao-Yang Lee. 2017. Granulites and Palaeoproterozoic lower crust of the Baidarik Block, Central Asian Orogenic Belt of NW Mongolia. Journal of Asian Earth Sciences, 145: 393-407.

Y. Rojas-Agramonte, I. S. Williams, R. Arculus, A. Kröner, A. García-Casco, C. Lázaro, S. Buhre, J. Wong, H. Geng, C. M. Echeverría, T. Jeffries, Xie Hangqian, R. Mertz-Kraus. 2017. Ancient xenocrystic zircon in young volcanic rocks of the southern Lesser Antilles island arc. Lithos, 290-291: 228-252.

Li Hongqiang, Gao Rui, Xiong Xiaosong, Wang Haiyan, Li Wenhui. 2017. Moho fabrics of North Qinling Belt, Weihe Graben and Ordos Block in China constrained from large Dynamite Shots. Geophysical Journal International, 209: 643-653.

Ye Zhuo, Li Jiangtao, Gao Rui, Song Xiaodong, Li Qiusheng, Li Yingkang, Xu Xiao, Huang Xingfu, Xiong Xiao- song, Li Wenhui. 2017. Crustal and Uppermost Mantle Structure Across the Tibet-Qinling Transition Zone in NE Tibet Implications for Material Extrusion Beneath the Tibetan Plateau. Geophysical Research Letters, https: //doi.org/10.1002/2017GL07514.

Zhang Xinyan, Wang Yanghua, Gao Rui, Xu Tao, Bai Zhiming, Tian Xiaobo, Li Qiusheng. 2017. Vertical crustal motions across Eastern Tibet revealed by topography-dependent seismic tomography. Scientific Reports, doi: 10.1038/s41598-017-03578-z.

Guo Xiaoyu, Li Wenhui, Gao Rui, Xu Xiao, Li Hongqiang, Huang Xingfu, Ye Zhuo, Lu Zhanwu, S. L. Klemperer. 2017. Nonuniform subduction of the Indian crust beneath the Himalayas. Scientific Reports, doi: 10.1038/s41598-017-12908-0.

Xu Xiao, Gao Rui, Guo Xiaoyu, Li Wenhui, Li Hongqiang, Wang Haiyan, Huang Xingfu, Lu Zhanwu. 2017. Outlining tectonic inheritance and construction of the Min Shan region, eastern Tibet, using crustal geometry. Scientific Reports, doi: 10.1038/s41598-017-14354-4.

Xu Xiao, Gao Rui, Dong Shuwen, Wang Haiyan, Guo Xiaoyu. 2017. Lateral extrusion of the northern Tibetan Plateau interpreted from seismic images, potential field data, and structural analysis of the eastern Kunlun fault. Tectonophysics, 696–697: 88-98.

Pan Xiaofei, Hou Zengqian, Li Yan, Chen Guohua, Zhao Miao, Zhang Tianfu, Zhang Cheng, Wei Jin, Kang Chuan. 2017. Dating the giant Zhuxi W–Cu deposit (Taqian–Fuchun Ore Belt) in South China using molybdenite Re–Os and muscovite Ar–Ar system. Ore Geology Reviews, 86: 719–733.

Gong Xuejing, Yang Zhusen, Meng Xiangjin, Pan Xiaofei,Wang Qian, Zhang Lejun. 2017. Late Paleozoic to Mesozoic Intrusions Distribution in the North Sanjiang Orogenic Belt, Southwest China: Evidence from Zircon U-Pb Dating and Geochemistry. Acta Geologica Sinica (English Edition), 91(3): 898-946.

Zhang Jianjun, Wang Tao, Tong Ying, Zhang Zhaochong, Song Peng, Zhang Lei, Huang He, Guo Lei, Hou Zengqian. 2017. Tracking deep ancient crustal components by xenocrystic/inherited zircons of Palaeozoic felsic igneous rocks from the Altai–East Junggar terrane and adjacent regions, western Central Asian Orogenic Belt and its tectonic significance. International Geology Review, 59(16): 2021-2040.

Yan Zhen, Chen Lei, S. Buckman, Fu Changlei, Guo Xianqing. 2017. Stratigraphy and tectonic setting of Laochang massive sulfide deposit in the North Qinling belt, central China. Ore Geology Reviews, 81: 96-111.

W. M. Saktura, S. Buckman, A. P. Nutman, E. A. Belousova, Yan Zhen, J. C. Aitchison.2017. Continental origin of the Gubaoquan eclogite and implications for evolution of the Beishan Orogen, Central Asian Orogenic Belt, NW ChinaOriginal. Lithos, 294-295: 20-38.

A. A.A.D. Hakro, Xiao Wenjiao, Yan Zhen, A. S. Mastoi. 2017. Provenance and tectonic setting of Early Eocene Sohnari Member of Laki Formation from southern Indus Basin of Pakistan. Geological Journal, doi: 10.1002/gj.3011.

Liu Yingchao, M. A. Kendrick, Hou Zengqian, Yang Zhusen, Tian Shihong, Song Yucai, M. Honda. 2017. Hydrothermal Fluid Origins of Carbonate-Hosted Pb-Zn Deposits of the Sanjiang Thrust Belt, Tibet: Indications from Noble Gases and Halogens. Economic Geology, 112(5): 1247-1268.

Ma Wang, Liu Yingchao, Yang Zhusen, Li Zhenqing, Zhao Xiaoyan, Fei Fan. 2017. Alteration, mineralization, and genesis of the Lietinggang–Leqingla Pb–Zn–Fe–Cu–Mo skarn deposit, Tibet, China. Ore Geology Reviews, https: //doi.org/10.1016/j.oregeorev.2017.04.034.

Wang Tao, Wang Zongqi, Ma Zhenhui, Wang Dongsheng. 2017. Provenances and tectonic implications of Paleozoic siliciclastic rocks from the Baishuijiang Group of the southern Qinling belt, central China. Journal of Asian Earth Sciences, 138: 608–628.

Wang Dongsheng, Wang Tao, Yan Jing, Lin Xin. 2017. Petrogenesis and tectonic implications of early Palaeozoic igneous rocks of the western South Qilian Belt, central China. International Geology Review, http: //dx.doi.org/10.1080/00206814.2017.1356247.

Chai Peng, Hou Zengqian, Zhang Zhiyu. 2017. Geology, fluid inclusion and stable isotope constraints on the fluid evolution and resource potential of the Xiadian gold deposit, Jiaodong Peninsula. Resource Geology, 67: 341-359.

Kuang Hongwei, Jin Guangchun, Gao Zhenzhong. 2017. Sedimentary facies and evolution of the lower Urho Formation in the 8th area of Karamay oilfield of Xinjiang, NW China. Cogent Geoscience, https: //doi.org/10.1080/23312041.2017.1333667.

Kuang Hongwei, Song Tianrui, Liu Yongqing, Peng Nan, Zhu Zhicai, Fan Zhengxiu, Wang Yuchong, Xia Xiaoxu, Song Huanxin, Tang Yong. 2017. The cosmic spherules firstly discovered in carbonaceous siltstone from the Taizi Formation of the Mesoproterozoic Shennongjia Group, central China. Acta Geologica Sinica(English Edition), 91(3): 1137-1138.

Kuang Hongwei, Jin Guangchun, Liu Yongqing. 2017. A Sedimentary Analysis of the Cretaceous Delta Sandbodies in the Kuqa River-Kelasu River Area, Northern Tarim Basin, Xinjiang, Northwestern China. Advances in Engineering Research, 70: 156-165.

Xu Huan, Liu Yongqing, Kuang Hongwei, Peng Nan. 2017. The 144-140 Ma mafic dykes in north China and northeast China indicating regional extensional tectonic setting. Acta Geologica Sinica(English Edition), 91(1): 353-354.

12.2 Chinese language publications with English abstract:

Han Kunying, Xu Kejuan, Gao Linzhi, Ding Xiaozhong, Ren Liudong, Liu Yanxue, Pang Jianfeng. 2017. U-Pb age and Lu-Hf isotope of detrital zircons from the meta-sedimentary rocks in the Yunkai region and their geological significance. Acta Petrologica Sinica, 33(9): 2939-2956.

Kou Caihua, Liu Yanxue, Li Tingdong, Huang He, Zhang Heng. 2017. LA-ICP-MS U-Pb dating and Hf isotopes of detrital zircon grains from siltstone of Danzhou Group in northern Guangxi and their geological significance. Geological Bulletion of China, 36 (8): 1393-1406.

Kou Caihua, Liu Yanxue, Li Tingdong, Ding Xiaozhong, Zhang Heng, Lu Jipu. 2017. Mineralogical characteristics of clinopyroxene from the Neoproterozoic, Changjie olivine pyroxenolite in Tongdao County, western Hunan, ----an evidence for the intraplate rift origin. Geological Review, 63(4): 881-893.

Kou Caihua, Liu Yanxue, Li Tingdong, Ding Xiaozhong, Zhang Heng. 2017. Mineralogy and mineral chemistry of the Jinche gabbro in the Longsheng area of northern Guangxi in the western segment of the Jiangnan Orogen and its geological significance. Acta Petrological et Mineralogical, 36(1): 20-35.

Tian Fei, Wang Yong, Chi Zhenqing, Liu Jin, Jiang Nan, Tang Wenkun, Yao Peiyi. 2017. Evolution of climate and environment in southeastern margin of Inner Mongolia since Late Quaternary. Journal of Geomechanics, 23(4): 602-611.

Tang Wenkun, Wang Yong, Dong Jin, Tian Fei, Liu Jin, Jiang Nan. 2017. Early-Middle Holocene paleoenvironmental evolution revealed by a lacustrine sediment sequence in Leizhou Peninsula. Geological Bulletion of China, 36(9): 1625-1634.

Tang Wenkun, Wang Yong, Dong Jin, Tian Fei, Liu Jin, Jiang Nan. 2017. High resolution paleoenvironmental evolution revealed by a lacustrine sediment sequence in Shuangchi Maar lake during past 2000 years in North Hainan Island. Northwestern Geology, 50(1): 291-300.

Pang Jianfeng, Ding Xiaozhong, Han Kunying, Zeng Yong, Chen Anshu, Zhang Yanling, Zhang Qinghe, Yao Dongsheng. 2017. 1: 1 Million Digital Geological Map Spatial database of China. Geology in China, 44 Supp(1),8-18.

Zhao Heng, Zhang Jin, Wang Yannan, Zhang Beihang. 2017, The deformation features, phases and significance of the Keluo complex in Nenjiang area, Heilongjinag Province. Geotectonica et Metallogenia, 41(4): 617-637.

Zheng Rongguo, Li Jinyi, Liu Jianfeng. 2017. The age of volcanic rocks of Amushan Formation on the northern margin of Alxa block: Evidence from zircon U-Pb data, Geology in China, 44(3), 612-613.

Li Jinyi, Liu Jianfeng, Zheng Rongguo, Feng Qianwen, Zheng Peixi, Zhu Zhixin, Wang Lijia, Zhang Xiaowei, Song Biao. 2017. The eruptive timing of Permian basalts in Keping area, the northwest margin of Tarim Basin, China: evidence from detrital zircons. Journal of Earth Sciences and Environment, 39(3): 301-325.

Xu Qinqin, Ji Jianqing, Zhao Wentao, Yu Xiangjiang. 2017. Uplift-Exhumation History of Daqing Mountain, Inner Mongolia Since Late Mesozoic. Acta Scientiarum Naturalium Universitatis Pekinensis, 53(1), 57-65.

Ren Jishun, Xu Qinqin, Zhao Lei, Zhu Junbin. 2017. From Geosyncline—Platform Theory, Plate Tectonics to the Multisphere Tectonic View of Earth System. Geological Review, 63(5): 1133-1140.

Ren Jishun, Zhao Lei, Li Chong, Zhu Junbin, Xiao Liwei. 2017. Thinking on Chinese tectonics——duty and responsibility of Chinese geologists. Geology in China, 44(1): 33-43.

Zhu Junbin, He Zhengjun. 2017. Detrital zircon records of upper Permian-Middle Triassic sedimentary sequence in the Linxi area, Inner Mongolia and constraints on timing of final closure of the Paleo-Asia Ocean (Eastern Segment). Acta Geologica Sinica, 91(1): 232-248.

Zhu Junbin, He Zhengjun. 2017. Detrital zircon U-Pb ages and Hf isotopes of Early-Middle Permian sandstones from the south margin of Xing-Meng orogenic belt and their tectonic significance. Geological Bulletin of China, 36(2-3): 357-371.

Zong Pu, Ma Xueping, Zhang Meiqiong, Zhang Yubo, Lv Dan. 2017. Comparative study of Famennian carbon isotope characteristics of Junggar, Xinjiang and central Hunan, South China. Acta Scientiarum Naturalium Universitatis Pekinensis, 53(5): 843-861.

Zong Pu. 2017. The latest Devonian mass extinction event and its representations in west Junggar, Xinjiang. Xinjiang Geology, 35(2): 122-126.

Bo Jingfang, Yao Jianxin, Xiao Jiafei, Bai Yuming, Peng Chuankai. 2017. Scleractinian Coral and Conodont Biostratigraphy of the Middle-Upper part of the Poduan Formation in Ceheng, Guizhou Province, South China. Acta Geologica Sinica, 91(2): 487-497.

Shen Caizhi, Zhao Bo, Gao Chunling, Lv Junchang, M. Kundrat. 2017. A New Troodontid Dinosaur (Liaoningvenator curriei gen. et sp. nov.) from the Early Cretaceous Yixian Formation in Western Liaoning Province. Acta Geoscientica Sinica, 38(3): 359-371.

Sun Qian, Ji Zhansheng, Liao Weihua, Yao Jianxin, Wu Guichun, Wu Zhenjie. 2017. The Discovery of coral fossils in Sabozhibule Formation, Baoji area, Bange County, Xizang(Tibet) and its significances. Geological Review, 63(Supplement): 323-324.

Shi Qiuyuan, Ji Zhansheng, Wu Guichun, Li Hao, He Jifu, Zhong Zhao. 2017. Discovery of the Middle Permian coral fossils in the north of Geren Lake, Xizang(Tibet). Geological Review, 63(Supplement): 319-320.

He Jifu, Ji Zhansheng, Liu Jingyan, Wu Guichun, Shi Qiuyuan, Li Hao, Zhong Zhao. 2017. Discovery of the early Cretaceous coral in Rila Formation in the north of Yongzhuema, Xainza County. Geological Review, 63(Supplement): 315-316.

Li Hao, Ji Zhansheng, Wu Guichun, Shi Qiuyuan, He Jifu, Zhong Zhao. 2017. Discovery of the Early Cretaceous coral fauna in south of Mayuexiang area, Xizang(Tibet) and its significances. Geological Review, 63(Supplement): 317-318.

Zhong Zhao, Ji Zhansheng, Wu Guichun, Liu Jingyan, Shi Qiuyuan, Li Hao, He Jifu. 2017. Discovery and significance of the Lower Carboniferous coral fauna in the Nam Lake, Baoji Area, Xizang(Tibet). Geological Review, 63(Supplement): 333-334.

Meng Yazhou, Ji Zhansheng, Yao Jianxin, Wu Guichun, Sun Qian, Liao Weihua, Pan Huazhang. 2017. Mesozoic fossils discovered in the Paleozoic mélange at the Zhaqiong area of Bange County, Tibet. Acta Geologica Sinica, 91(4): 812-821.

Ji Shu'an, Lu Liwu, Zhang Lifu, Yuan Chongxi, Jiang Shan, Chen Xiaoyun, Hou Yandong. 2017. Recent progress in the study of the Early Cretaceous dinosaur fauna from the Ordos region, Inner Mongolia. Geology in China, 44(1): 196-197.

Hou Yandong, Ji Shu'an. 2017. New findings of stegosaurs from the Lower Cretaceous Luohandong Formation in the Ordos Basin, Inner Mongolia. Geological Bulletin of China, 36(7): 1097-1103.

Tian Zhonghua, Liu Fulai, Xu Wang, Ji Lei, Liu Lishuang, Dong Yongsheng. 2017. Structure geology application in metamorphic mapping—an example of mapping the Liaohe Group in the central segment of Jiao-Liao-Ji Orogenic belt. Geological Bulletin of China, 36(11): 53-63.

Geng Yuansheng, Kuang Hongwei, Liu Yongqing, Du Lilin. 2017. Subdivision and correlation of the Mesoproterozoic stratigraphy in the western and northern margins of Yangtze Block. Acta Geologica Sinica, 91(10): 2151-2174.

Yang Chonghui, Du Lilin, Geng Yuansheng, REenLiudong, Lu Zenglong, Song Huixia. 2017. Paleoproterozoic metamafic dyke swarms in the East Hebei massif, the eastern North China Craton: ~2.1Ga extension and ~1.8Ga Metamorphism. Acta Petrologica Sinica, 33(9): 2827-2849.

Xue Huaimin, Cao Guangyue, Liu Zhe. 2017. Mapping test of lithological association-lithofacies on continental volcanic rocks field – example of western Taipusi caldera. Geological Bulletion of China, 36(11): 2030-2035.

Cai Jia, Liu Fulai, Liu Pinghua, Liu Jianhui, Wang Fang, Shi Jianrong. 2017. Zircon geochronology of the Paleoproterozoic high-grade supracrustal rocks from the Huai'an terrane, northwestern Hehei. Acta Petrologica Sinica, 33(9): 2811-2826.

Liu Pinghua, Cai Jia, Zou Lei. 2017. Matamorphic P-T-t path and its geological implication of the Sanjiazi garnet amphibolites from the northern Liaoning Penisula. Jiao-Liao-Ji belt. Acta Petrologica Sinica, 33 (9): 2649-2674.

Liu Chaohui, Cai Jia. 2017. Provenance and depositional age of the Baiyunshan Formation of the Fengyang Group in the Wuhe Complex: Constraints from zircon U-Pb age and Lu-Hf isotopic studies. Acta Petrologica Sinica, 33(9), 2867-2880.

Wang Wei, Yang Hong, Ji Lei. 2017. The identification of the Neoarchean 2.52-2.46Ga tectono-thermal events from the Liaonan terrain and its geological significance. Acta Petrologica Sinica, 33(9): 2775-2784.

Wang Fang, Liu Fulai, Ji Lei, Liu Lishuang. 2017. LA-ICP-MS U-Pb dating of detrital zircon from low-grade metamorphic rocks of the Lancang Group in the Lancangjiang Complex and its tectonic implications. Acta Petrologica Sinica, 33(9): 2975-2985.

Wang Fang, Liu Jianhui, Liu Chaohui. 2017. Detrital zircon U-Pb geochronology of metasedimentary rocks from the Li'eryu Formation of the South Liaohe Group in Sanjiazi area, the South Liaoning province. Acta Petrologica Sinica, 33(9): 2785-2791.

Tian Zhonghua, Liu Lishuang, Dong Yongsheng. 2017. Geodynamic origin of the earliest tectonic event (D1) and its related

structural elements in the Paleoproterozoic Liaohe Group, central Jiao-Liao-Ji structural belt. Acta Petrologica Sinica, 33(9): 2758-2774.

Yang Hong, Wang Wei, Liu Jianhui. 2017. Zircon U-Pb dating and its geological significance of granitic pegmatites from the Kuandian and Sanjiazi area in eastern Liaoning Province. Acta Petrologica Sinica, 33(9): 2675-2688.

Ji Lei, Liu Fulai, Wang Fang, Cai Jia, Wang Wei, Tian Zhonghua, Liu Lishuang. 2017. Polyphase metamorphism in Diancang Shan-Ailao Shan complex zone: Constraints from U-Pb dating and trace elements of zircons in metasedimentary rocks, Gasa area. Acta Petrologica Sinica, 33(2): 605-621.

Ji Lei, Liu Fulai, Wang Fang. 2017. Multiple granitic magma events in north -middle segment of Diancang Shan -Ailao Shan complex zone: Implications for tectonic evolution. Acta Petrologica Sinica, 33(9): 2957-2974.

Xu Wang, Liu Fulai, Liu Chaohui. 2017. Petrogenesis and geochemical characteristics of the North Liaohe metabasic rocks, Jiao-Liao-Ji orogenic belt and their tectonic significance. Acta Petrologica Sinica,33(9): 2743-2757.

Liu Lishuang, Liu Fulai, Wangwei. 2017. The polygenetic meta-mafic rocks from the northeast of Sulu ultrahigh-pressure metamorphic belt: Insight from petrology, isotope geochronology and geochemistry. Acta Petrologica Sinica, 2899-2924.

Wang Xiangjian, Liu Jianhui, Ji Lei. 2017. Zircon U-Pb chronology, geochemistry and their petrogenesis of Paleoproterozoic monzogranitic gneisses in Kuandian area, eastern Liaoning Province, Jiao-Liao-Ji Belt, North China Craton. Acta Petrologica Sinica, 33(9): 2689-2707.

Li Lun, Yang Yongqiang, Yang Chonghui, Du Lilin, Song Huixia, Ren Liudong, Xie Jin, Liu Dapeng,Yang Yuhao. 2017. The petrogenesis and tectonic setting of ca. 2.5 Ga A-type granite in the Zanhuang complex: an example from the Huangcha granite. Acta Petrologica Sinica, 33(9): 2850-2866.

Liu Zhe, Xue Huaimin, Cao Guangyue. 2017. Zircon U−Pb geochronology, intraplate extensional environment and genesis of Mesozoic volcanic rocks in Zhenglan Banner area, Inner Mongolia, China. Geology in China, 44 (1): 151-176.

Zhang Qizhi, Ba Dengzhu, Xiong Fahui, Yang Jingsui. 2017. Discussion on genesis process and deep prospecting breakthrough of Luobusa chromitite, Tibet. Geology in China, 44(2): 224-242.

Guo Wenfeng, Liu Yongshun, Wu Cailai, Wei Haiquan, Nie Baofeng, Peng Nian, Chen Zhengquan, Lei Min. 2017. Discovery and implications of the chaotic attractor from zoned pyroxene in Qixiangzhan comenditic lava, Tianchi volcano, NE China. Chinese Science Bulletin, 62(30): 3470-3478.

Li Peng, Zhang Cong, Liu Xiaoyu, Shen Tingting, Qiu Tian, Yang Jingsui. 2017. The metamorphic processes of the Xindaduo eclogite in Tibet and its constrain on the evolutionary of the Paleo-Tethys subduction zone. Acta Petrologica Sinica, 33(12): 3753-3765.

Gao Li'e, Gao Jiahao, Zhao Linghao, Hou Kejun, Tang Suohan. 2017. The Miocene leucogranite in the Nariyongcuo gneiss domes, southern Tibet: products from melting metapelite and fractional crystallization. Acta Petrologica Sinica, 33(8): 2395-2411.

Zeng Lingsen, Gao Li'e, Guo Chunli, Hou Kejun, Wang Qian. 2017. Early Cretaceous forearc extension of the Gangdese continental arc, southern Tibet. Acta Petrologica Sinica, 33(8): 2377-2394.

Zeng Lingsen, Gao Li'e. 2017. Cenozoic crustal anatexis and the leucogranites in the Himalayan collisional orogenic belt. Acta Petrologica Sinica. 33(5): 1420-1444.

Guo Chunli, Zeng Lingsen, Gao Li'e, Su Hongzhong, Ma Xinghua, Yin Bing. 2017. Highly Fractionated Granitic minerals and Whole-rock Geochemistry Prospecting markers in Hetian, Fujian Province. Acta Geologica Sinica, 91(8): 1796-1817.

Zhao Linghao, Zeng Lingsen, Hu Mingyue, Sun Dongyang. 2017. Rutile to titanite transformation in amphibolite and its geochemical consequences: A case study of the amphibolite from Yarlung Tsangpo suture zone. Acta Petrologica Sinica, 33(8): 2494-2508.

Gao Jiahao, Zeng Lingsen, Guo Chunli, Li Qiuli, Wang Yaying. 2017. Late Cretaceous tectonics and magmatism in Gangdese batholith, southern Tibet: a record from the mafic-dioritic dike swarms within the Baidui Complex, Lhasa. Acta Petrologica Sinica, 33(8): 2412-2436.

Han Jianguang, Wang Yun, Chen Chuanxu, Yu Changqing. 2017. Multiwave Gaussian beam prestack depth migration for 2D anisotropic media. Progress in Geophysics (in Chinese), 32 (3): 1130-1139.

Han Jianguang. 2017. The software of GB-PSDM under complex near-surface conditions. 2017SR040329.

Han Jianguang.2017.The software of directly extracting ADCIGs based on Gaussian beam migration.2017SR040503

Tian Zuolin, Kang Dongyan, Mu Hongchen. 2017. Metamorphic P-T-t path of garnet amphibolite from the Eastern Himalayan Syntaxis: Phase equilibria and zircon chronology. Acta Petrologica Sinica, 33(8): 2467-2478.

Yang Shaohua, Xu Zhiqin, Li Zhonghai, Shi Yaolin. 2017. Constraint of impact craters on ice thickness on the Europa. Chinese Journal of Geophysics, 60(3): 935-940.

Yi Zhiyu, Li Zhonghai, Xu Zhiqin, Huang Baochun. 2017. India-Asia collision near the western syntaxis-constraints from

paleomagnetism, seismic tomography and numerical modeling. Progress in Geophysics, 32 (4): 1510-1520.

Mao Xiaohong, Zhang Jianxin, Yu Shengyao Li Yunshuai, Yu Xingxing, Lu Zenglong. 2017. Early Paleozoic granulite-facies metamorphism and anatexis in the northern West Qinling orogen: Monazite and zircon U-Pb geochronological constraints. Science China (Earth Sciences), 47(5): 601-616.

Yu Xingxing, Zhang Jianxin, Mao, Xiaohong, Lu Zenglong. 2017. High pressure/low-temperature mélange in the central North Qilian Mountains: evidence from Petrology, geochemistry and geochronology. Acta Petrologica et Minerlogica, 36(2): 196-212.

Zhou Guizheng, Zhang Jianxin, Li Yunshuai, Yu Shengyao, Yu Xingxing, Mao Xiaohong, Lu Zenglong. 2017. Redefinition of the polyphase tectonothermal events of the North Qaidaim HP/UHP metamorphic terrane: evidence from zircon and monazite U-Pb geochronology of the Yuka HP metapelites. Acta Petrologica Sinica, 33(12): 3801-3814.

Lu Zenglong, Zhang Jianxin, Mao Xiaohong, Zhou Guisheng, Peng Yinbiao. 2017. Palaeoproterozoic mafic granulite in the eastern Oulongbuluke block of the north Qaidaim Mountains: evidence from petrology, zircon U-Pb dating and Hf isotope. Acta Petrologica Sinica, 33(12): 3815-3828

Su Dechen, Li Chunwang, Sun Aiping, Qiao Xiufu. 2017. Mesoproterozoic mud volcanoes discovered in North Taihang Mountain: Preliminary results. Geology in China, 44(2): 399-400.

Lü Hongbo, Su Dechen, Zhang Yuxu, Feng Xuedong, Li Chunwang. 2017. Landform Features of Salt Weathering in Different Climatic Zones in China. Geological Review, 63(4): 911-926.

Su Dechen, Sun Aiping. 2017. Beauty of Geology-Classical Landforms. Petroleum Publishing House, P218.

Qiao Xiufu, Li Haibing, Su Dechen, et al. 2017. Soft Sediment Deformation Structures--Earthquake And Ancient Earthquake Records. Geology Publishing House, P278.

Ma Yuan, Xu Zhiqin, Li Guangwei, Ma Shiwei, Ma Xuxuan, Chen Xijie, Zhao Zhongbao. 2017. Crustal deformation of the Gangdese Cretaceous back-arc basin and formation of Proto-plateau, south Tibet. Acta Petrologica Sinica, 33(12): 3861-3872.

Wang Nan, Wu Cailai, Lei Min, Chen Hongjie, Li Mingze, Zheng Weihong. 2017. Geochronology and petrogenesis of granite in Shibaocheng area from the north Qilian orogenic belt. Acta Petrologica Sinica, 33(12): 3909-3924.

Tang Suohan, Li Jin, Liang Xirong, Zhang Liguo, Li Guozhan, Pu Wei, Li Chaofeng, Yang Yueheng, Chu Zhuyin, Zhang Jun, Hou Kejun, Wang Xiaoming. 2017. Reference Material Preparation of 143Nd/144Nd Isotope Ratio. Rock and Mineral Analysis, 36 (2): 163-170.

She Yuwei, Zhu Xiangkun, He Yuan, Ma Jianxiong, Sun Jian. 2017. The new discovery of the podiform chromitite in the Xigaze ophiolite, Yarlung Zangbo suture zone, Tibet. Geology in China, 44(3): 610-611.

Shen Weibing, Pang Xiongqi, Chen Jianfa, Yang Haijun, Yan Bin, Wang Yangyang, Zhu Xinjian, Zhao Zhengfu. 2017. Types and Distribution of Deep Oil and Gas Pools in the Tarim Basin, NW China. Geological Journal of China Universities, 23 (2): 324-336.

Qi Tianjiao, Xue Chunji, Zhu Xiangkun. 2017. Fe-O-S isotopic and geochemical characteristics of the Cihai iron deposit, Xinjiang. Geological Bulletin of China, 36 (6): 1064-1076.

Sun Jingbo, Chen Wen, Yu Shun, Shen Ze, Tian Yuntao. 2017. Study on zircon (U-Th) /He dating technique. Acta Petrologica Sinica, 33(6): 1947-1956.

Zhang Yan, Qi Fucheng, Chen Wen, Ye Huishou. 2017. Geochemical significance of lower-middle Silurian bedded cherts on the northern margin of the Yangtze Block: Assessing their origin and paleodepositional setting. Acta Geologica Sinica, 91(10): 2322-2350.

Yuan Xia, Chen Wen, Zhang Bin, Sun Jingbo, Yu Shun, Yin Jiyuan, Zhang Yan, Liu Xinyu, Yang Li, Zhang Yan. 2017. 40Ar/39Ar age of sericite and genetic study of Wangfeng gold deposite, West Tianshan Mountains. Mineral Deposits, 36(1): 57-67.

Wan Yusheng, Dong Chunyan, Ren Peng, Bai Wenqian, Xie Hangqiang, Liu Shoujie, Xie Shiwen, Liu Dunyi. 2017. Spatial and temporal distribution, compositional characteristics and formation and evolution of Archean TTG rocks in the North China Craton: A synthesis. Acta Petrologica Sinica, 33(5): 1405-1419.

Ren Peng, Xie Hangqiang, Wang Shijin, Niu Jian, Dong Chunyan, Bai Wenqian, Wan Yusheng. 2017. ~ 2.6 Ga anatexis in western Shandong: Geology and geochemistry of leucosomes in the Taishan area. Chinese Journal of Geology, 52(4): 1097-1119.

Bao Zemin, Liu Guangda, Long Tao, Qiu Chunling, Tian Di, Liu Dunyi. 2017. TOF-MS overlapped peak separation approach based on characteristic peak matching. Journal of Jilin University(Engineering and Technology Edition), 47(1): 301-307.

Wang Peizhi, Tian Di, Long Tao, Li Difei, Qiu Chunling, Liu Dun-yi. 2017. Automatic focusing algorithm for TOF-SIMS zircon sample image. Journal of Jilin University(Engineering and Technology Edition), 47(1): 308-315.

Shi Zhiqiang, Shi Yuruo. 2017. Formation and Metamorphic Ages of the Banded Iron Formation in Fangmayu of Miyun, Beijing: Zircon SHRIMP U-Pb Dating. Geoscience, 31(1): 1-10.

Xie Hangqiang, Wan Yusheng, Zhou Xiaodong, Ren Peng, Li Yuan. 2017. The disintegration of Haigou complex in Antu County, Jilin Province: Evidence from geology and zircon SHRIMP U-Pb dating. Chinese Journal of Geology, 52(4): 1140-1159.

Li Yuan, Xie Hangqiang, Song Zhirui. 2017. SHRIMP U-Pb zircon ages of the northeastern Jiangxi ophiolites and the Zhangcun Group and a discussion on the tectonic evolution of the Jiangnan Orogen. Geological Review, 63(4): 854-868.

Zheng Ying, Fan Runlong, Zhang Yuhai, Qiu Chunling, Liu Dunyi, Tian Di. 2017. Control software for TOF-SIMS based on Labview object oritend programming. Journal of Chiinese Mass Spectromertry Society, 38(5): 591-598.

Fan Runlong. 2017. Control Software for TOF-SIMS. Software copyright registration number: 1890793.

Fan Runlong. 2017. Data analysis software for TOF-SIMS. Software copyright registration number: 2128066.

Long Tao, Bao Zemin, Wang Peizhi, Qi Guochen, Jiang Ruolin, Shi Jian, Zhang Yuhai, Liu Dunyi. 2017. Patent: The control method of ion detector, mass analyzer and ion detection applied to TOF mass spectrometer. Registration number: ZL 2015 1 0038857.7.

Long Tao, Qi Guochen, Wang Peizhi, Bao Zemin, Jiang Ruolin, Fan Runlong, Zhang Yuhai, Liu Dunyi. 2017. Patent: A time of flight mass analyzer. Registration number: ZL 2015 1 0454860.7

Guo Xiaoyu, Gao Rui, Gao Jianrong, Xu Xiao, Wang Haiyan, Huang Xingfu, Li Wenhui, Li Hongqiang. 2017. Integrated analysis on the deformation of the Liupan Shan fold-thrust belt, NE Tibet, and its tectonic attribution. Chinese Journal of Geophysics. 60(6): 2058-2067.

Li Wenhui, Gao Rui, Wang Haiyan, Li Yingkang, Li Hongqiang, Hou Hesheng, Xiong Xiaosong, Guo Xiaoyu, Xu Xiao, Zou Changqiao, Liang Hongda. 2017. Crustal structure beneath the Liupanshan fault zone and adjacent regions. Chinese Journal of Geophysics, 60(6): 2265-2278.

Lü Bin, Wang Tao, Tong Ying, Zhang Lei, Yang Qidi, Zhang Jianjun. 2017. Spatial & temporal distribution and tectonic settings of magmatic-hydrothermal ore deposits in the Eastern Central Asia Orogen Belt. Journal of Jilin University(Earth Science Edition), 47(2): 305-343.

Song Peng, Tong Ying, Wang Tao, Qin Qie, Zhang Jianjun, Ning Dongxu. 2017. Zircon U-Pb ages and genetic evolution of Devonian granitic rocks in the southeastern Chinese Altai and its tectonic implications: new evidence for magmatic evolution of calc-alkaline-high-K calc-alkaline-alkaline rocks. Acta Geologica Sinica, 91(1): 55-79.

Tong Ying, Guo Lei, Wang Tao, Zhang Lei, Huang He, Zhang Jianjun. 2017. Pedigree mapping of cogenetic granitoids: A case study of Baoder Stone Forest granitic pluton in Erlian, Inner Mongolia. Geological Bulletin of China, 36(11): 11-18.

Wang Haiyan, Gao Rui, Lu Zhanwu, Li Wenhui, Guo Hua, Xiong Xiaosong, Feng Shaoying, Li Hongqiang, Zhao Yulian. 2017. Deep crustal structure in Sichuan basin: Deep seismic reflection profiling. Chinese Journal Of Geophysics, 60(8): 2913-2923.

Wu Wei, Liu Qiyuan, He Rizheng, Qu Zhongdang. 2017. Waveform inversion of S-wave velocity model in the central Qiangtang in North Tibet and its geological implications. Chinese Journal Of Geophysics, 60(3): 941-952.

Xu Tairan, Lu Zhanwu, Wang Haiyan, Li Hongqiang, Li Wenhui. 2017. Main technology of deep seismic reflection data processing. Progress in Geophysics, 32(2): 762-774.

Zhang Xinyan, Gao Rui, Bai Zhiming, Xu Tao, Li Qiusheng. 2017. Crustal structure beneath the Longmenshan area in eastern Tibet: new constrains from reprocessing wide-angle seismic data of the Aba-Longmenshan-Suining profile. Chinese Journal Of Geophysics, 60(6): 2200-2212.

Zhang Xinyan, Xu Tao, Bai Zhiming, Gao Rui, Li Qiusheng, Liu Youshan, Zhang Zhi. 2017. High-precision reflection traveltime tomography for velocity structure with an irregular surface. Chinese Journal of Geophysics, 60(2): 541-553.

Zhao Jianxin, Tong ying, Meng Guixiang, Wang Tao, Zhang Zhaochong, Zhang Jianjun. 2017. Zircon U-Pb age and petrogenesis of the Lüshigou high Ba-Sr quartz-monzonite in East Junggar, Xinjiang, and its geological significance. Acta Petrologica et Mineralogica, 36(5): 743-754.

Qu Zhongdang, He Rizheng, Zhang Xunhua, Wu Wei. 2017. The time-frequency domain phase filter and its application in noise suppression of teleseismic receiver functions. Chinese Journal Of Geophysics, 60(4): 1389-1397.

Zou Changqiao, He Rizheng, Duan Yonghong, Wei Yunhao, Liu Qiaoxia, Liu Yang. 2017. Deep structure beneath the eastern Altyn Tagh fault and its vicinity derived from teleseismic P-wave tomography. Chinese Journal Of Geophysics, 60(4): 1389-1397.

Yang Yanshen, Pan Xiaofei, Zhao Miao, Zhang Zhiyu, Gong Xuejing. 2017. The indication of lead isotopes to the source of rock-forming and ore-forming materials of some deposits in Dahutang ore concentration area, Jiangxi Province. Mineral Deposits, 36(6): 189-201.

Liu Yongqing, Kuang Hongwei, Peng Nan, Yang Hongwei. 2017. Meso-Neoproterozoic Sedimentological and Geological Landscape in Shennongjia Area. Geological Publishing House, 174.

Geng Yuansheng, Kuang Hongwei, Liu Yongqing, Du Lilin. 2017. Subdivision and Correlation of the Mesoproterozoic Stratigraphy in the Western and Northern Margins of Yangtze Block. Acta Geologica Sinica, 91(10): 2151-2174.

Xu Kemin, Kuang Hongwei, Qin Jie,Wang Youping, Peng Nan, Ning Zhenguo, Zhang Fuzhong, Liu Yongqing. 2017. New

discovery of terrestrial K−Pg boundary from Jiaolai Basin of Shandong Province. Geology in China, 44(1): 194-195.

Zhu Xiaosan, Lu Minjie, Cheng Wenjin, Song Yucai, Zhang Chao. 2017. Comparison of the geological mineralogy and geochemical characteristics of ore-bearing porphyries of porphyry deposits in the Andean and the Gandise metallogenic belts. Geological Bulletin of China, 36(12): 2143-2153.

Lu Jiayi, Zhao Hongjun, Zhu Xiaosan. 2017. Mining law characteristics of the Andean countries and their impacts on the mining investment of Chinese enterprises. Geological Bulletin of China, 36(12): 2332-2343.