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The history and outcomes of the 30th International Geological Congress, Beijing (1996)

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Introduction

The International Geological Congress (IGC) under the sponsorship of International Union of Geological Sciences (IUGS) is the Olympics in Earth science community. It aims to encourage the advancements of research in Earth science and has attracted the attention of Earth scientists all over the world. The themes and topics of each Congress reflect the research frontiers and hot spots of Earth science at that time. In a sense, the history of the IGC is a significant component of the history of Earth science, the changing themes of IGC reflect the evolution of the frontiers of Earth science research. Reviewing the history of IGC can help us understand the history of Earth science and help us grasp the future direction of Earth science.

China is a vast country, and its unique geological and geomorphic units such as the Qinghai-Tibet Plateau and the Loess Plateau are natural laboratories that earth scientists all over the world yearn for. However, after the founding of the People's Republic of China, due to various reasons, China's earth science community lacked communication with the outside world for a long time, which hinders the progress of Earth science in China and was also a great loss to the international Earth science community. It was not until 1978 that the situation quickly improved after China's Reform and Opening-up. On August 4-14, 1996, the 30th International Geological Congress (IGC) was held in Beijing, the capital of the People's Republic of China (PRC). It was the first IGC to be held in China. This Congress was not only a great opportunity for Chinese Earth scientists to integrate into the international Earth science community, but also an opportunity for Earth scientists from all over the world to get to know China. It was a great event for Earth scientists around the world, given China's potential and possible role in solving the major scientific problems facing the Earth science community at the time. Since the 30th IGC, Chinese Earth scientists have become more actively in global Earth science activities, China's progress in Earth science and its contribution to international Earth science community have been evident to all, which makes it more significant to review the 30th IGC.

The theme of the 30th IGC was "continental geology" with emphasis on continent-related tectonics and structures, energy and mineral resources, environmental protection and reduction of geological hazards, human

survival and sustainable development. Special attention was placed on the major, comprehensive and multidisciplinary problems the international geological community was facing at that time, with important themes that retrospectively were to prove even more relevant almost twenty five years later for our current society.

This congress was also perceived as a grand scientific event by the IGC prior to the turn of the century. Therefore, summarizing the main achievements of geological sciences in the 20th century (Gohau, 2006; Nelson, 2013; Cooper and Branagan, 2015; Berbert and Cordani, 2016) and looking to the future with discussion of controversial topics and the direction that development of the geological sciences would take in the 21st century were indeed also crucial pivotal themes of this congress. In his report, William S. Fyfe (1927-2013), the former president of the IUGS, called on all geologists to think about what to do now and in the future, and at the same time, he called on geologists all over the world to explore lines of research and work together to solve the common problems faced by mankind. There was an awareness by the participants and the IGC and IUGS councils at the congress that this was a pivotal moment for the geosciences to respond to the problems facing humanity and the earth as a planet and this emerges herein from a review of the themes, discussions and outcomes of the 30th IGC both within China itself as the host country and for the geological sciences community worldwide.

Preparations for the 30th IGC in Beijing

It was the wish of several generations of Chinese scholars to hold the International Geological Congress in China. Some Chinese geologists even said: "participating in the 30th IGC is a great blessing in my lifelong geological career" (Tong, 1996). Before the 30th IGC, especially before 1978, there were few opportunities for Chinese scholars to communicate with their international counterparts.

In 1969, John E. Armstrong (1912-1995), Secretary General of IUGS, sent a letter to the Ministry of Geology of China inviting Chinese scholars to participate in the 24th IGC to be held in Canada in 1972. Because of the "Taiwan issue", Chinese scholars decided to "ignore it" (Cao, 2020). However, J. S. Lee (1889-1971), then the Minister of the Ministry of Geology of China, suggested that a general reply

should be made to the invitation letter of Secretary General Armstrong, “indicating that we are still concerned about IGC” (Cao, 2020). On October 25, 1971, the United Nations General Assembly voted to restore the legitimate seat of the People’s Republic of China. Chinese scholars believed that it was time to participate in the IGC, so the Ministry of Geology and the Chinese Academy of Sciences began to actively prepare to participate in the IGC, arranged for geological institutions to hold a symposium, organized research and reported the topics to be presented at the 24th IGC. But in the end, Chinese scholars were unable to participate in the 24th IGC, also because of the “Taiwan issue”.

China began to open its doors to the world in 1976 when the 25th IGC was being held in Sydney, Australia. On the 19 August, by 36 votes in favor, 3 against and 5 abstentions, the council of the IUGS decided to cancel the membership of the “Republic of China” and accept the People’s Republic of China as a full member of the organization. After the above resolution was adopted by the IUGS, the delegation of the Chinese Geological Society arrived in Sydney by plane on August 22, which was the first time that representatives from the PRC participated in the council meeting of the International Union of Geological Sciences and the 25th IGC. Since then, China has participated in all the IGC congresses, and the number of participants from China is ranked third after the United States and Russia.

In the 1980s, China began to apply to host the IGC. During the 26th IGC held in Paris, France in 1980, the delegation from China orally expressed the wish to host the IGC. In 1984, China sent a 78-member delegation headed by Zhu Xun (1930-), the Minister of Ministry of Geology and Mineral Resources of China, to Moscow to participate in the 27th IGC. This time, the number of Chinese participants was more than that of every previous congress, and 350 papers from China were submitted to the congress. At this congress, China formally proposed to bid for the 29th IGC, and so did Japan and other countries.

Until 1984, the IGC had been held only one time in Asia, that was, the 22nd IGC held in India in 1964, and the IGC had never been held in East Asia. On this occasion in Moscow, Japan applied to host the IGC for the third time. Considering that the IGC had taken “continental geology” as the theme for several consecutive sessions, the IGC Executive Committee decided in March 1988 that the 29th IGC would be held in Japan and the 30th IGC in China. In the meantime, several international conferences were held in China: The 15th General Meeting of the International Mineralogical Association (1990), The 13th Congress of International Union for Quaternary Research (1991), The 9th Symposium of the International Association on Genesis of Ore Deposits (1994).

Before the 29th IGC’s first Council Meeting was held, Zhu Xun, then the Minister of the Ministry of Geology and Mineral Resources of China, formally applied for hosting the 30th IGC in 1996 on behalf of China. This application was discussed and adopted by the IGC Council.

In October 1993, the Organizing Committee of the 30th IGC was established in Beijing, including: (1) Honorary Committee: the president was Li Peng, the Premier of the State Council of China; (2) Organizing Committee; (3) Secretariat Bureau; (4) Advisory Committee, and (5) Fund-Raising Committee.

At the same time of bidding for holding the IGC, Chinese scholars began the preparations for the congress. The Organizing Committee

was formed of 49 ministries, commissions and state-owned corporations under the State Council of China and the Beijing Municipal Government. The president of the Committee was Song Ruixiang (1939-), then the minister of the Ministry of Geology and Mineral Resources of China; the Secretary-General was Zhang Hongren (1934-2016), then the vice-minister of the Ministry of Geology and Mineral Resources of China. Meanwhile, the Advisory Committee of the 30th IGC was formed, including renowned leaders and geoscientists from China. The organizing committee also established the China IGC Fund, and more than 300 young geologists from more than 70 countries were funded by the congress.

In order to let the scholars from the globe understand the geological achievements of the host country better, the journal *Episodes* of the IUGS published a special issue introducing the geological achievements of the host country before the congress. To this end, the Chinese Committee began to prepare topics for this volume, determine contributors, and conduct the organization and editing work in 1993, which lasted three years, and finally published it in issues 1-2, volume 18, 1995. There are 21 articles in the Special Issue. In addition to an article of the overview of China’s geological achievements, the other 20 articles introduced the main geological research status in China from different fields.

Before the congress, Chinese scholars also published a number of books and papers around the congress to introduce China’s geological achievements and the IGC, such as the *Historical Materials of the International Geological Congress (1876-1996)* (published by Science Press in 1996) introducing the previous IGCs (Wu, 1996), English papers and monographs introducing the developments of geology in China, etc.

Scientific Activities

The 30th IGC was attended by more than 6000 participants from 116 countries and regions (Fig. 1). Nearly half of the representatives were from China, and 268 scholars were from Japan, which was the largest number of foreign representatives. 8310 abstracts were received, 4 keynote lectures were given, more than 6000 oral and poster presentations were given and 20 short lectures and symposia were scheduled (Chen et al., 1997). Premier Li Peng, Honorary Chairman of the



Figure 1. The venue of the Opening Ceremony.



Figure 2. Premier Li Peng (centre front row) poses with renowned geoscientists.

congress, delivered an opening speech. President Jiang Zemin and Premier Li Peng met respectively with well-known Chinese and foreign geoscientists attending the congress (Fig. 2).

The four keynote lectures of the Plenary Session of the congress were given by four famous geoscientists. Professor Liu Dongsheng (1917-2008), Academician of the Chinese Academy of Sciences, had given a report on “Geological Environments in China and Global Changes”; former president of the Inter-Union Commission on the Lithosphere, Professor Kevin Burke (1929-2018) from the University of Houston (USA) had given a presentation on “Advances in Continental Dynamics”; Peter J. Cook (1938-), Director of the British Geological Survey had spoken on “Sustaining our Life Support Systems”; Academician Xiao Xuchang (1930-) from the Chinese Academy of Geological Sciences had given a lecture on “The Uplift of the Qinghai-Tibet Plateau and Its Effect on the Tectonics of China” (Chen et al., 1997).

The congress included 11 Special Symposia and 22 disciplinary Symposia. Special Symposia mainly focused on the major problems from Earth science at that time. The Special Symposia were subdivided into 71 sessions, including the origin and history of the Earth, geoscience and human survival, environment, natural disasters, global change and so on. The disciplinary Symposia comprised stratigraphy, paleontology, geo-history, sedimentology, marine geology and structural geology, covering all aspects of Earth science, with a total of 151 sessions. In which, Global tectonic belts, orogenic belts, sedimentary basins, mineral geology and environmental geology were the most concerned.

There were 6 short courses and 14 workshops during the congress, involving rock dynamics, cycle stratigraphy, seismic tomography, seismic disaster assessment methods, magmatic fluid dynamics, environmental geochemistry and human health. The purpose of short courses was to provide participants with specialized information or expand their range of knowledge. New basic knowledge of geology had been taught mainly by experts.

The scientific poster presentations covered the full range of topics and included comprehensive subject discussions. This form of scientific exchange was first introduced at the 28th IGC held in the United States in 1989, but on a smaller scale. Due to the extended presentation time available for a poster presentation, where a topic can be fully



Figure 3. The 30th IGC News.

discussed, this form of scientific communication proved to be very suitable for representatives from non-English speaking countries. Therefore, special arrangements were made for facilitating these presentations during the 30th IGC.

In order to coordinate the activities of the congress, the organizing committee also published the *IGC News*, which published the daily congress news, interviews, events/activity schedules and arrangements and the latest agenda (Fig. 3).

There were also some special delegates in attendance at the 30th IGC. The Youth Conference was held, which was the first time in the history of the IGC. More than 200 teenagers from all over the world participated in the “Earth and Mankind” summer camp held in Beijing. Teenagers visited The Geological Museum of China, the Peking Man Site at Zhoukoudian, etc.

There were also some special participants from China at the 30th IGC. One of them was Hu Meixing, who was rated as a “peasant geological expert” by the International Geological Research Association. He was born in the Yimeng mountain area of Shandong Province, where the geological structure is complex and the mineral resources are rich. From the 1970s to early in the 21st century, Hu Meixing found more than 60 rock ore bodies in this mountain area, with a potential development and utilization value of more than 10 billion yuan. In particular, “marshal red” granite building materials have become a pillar of the economy of local industry now. The work of Hu Meixing gradually attracted the attention of the geological community. Some famous geologists gave him academic guidance and provided him with specimen testing services free of charge. At the 30th IGC, he read out the paper “Reflections on the Economic Value of Comprehensive Utilization of Granite, Hornblende Containing Iron Ore and Gneiss”. The report put forward the important role of iron separation from three types of ore in alleviating the pressure on the world iron and steel smelting industry.

Qinghai-Tibet Plateau

The 30th IGC focused on the hot topics of Earth Science and issues closely related to human survival, such as the origin and history of the

Earth, environmental protection and geological disaster prediction, the future environment of global change, lithospheric structure and deep action, energy and minerals in the 21st century, etc. The Qinghai-Tibet Plateau, a natural laboratory for studying Earth history, global change and lithospheric structure, had been the focus of many geologists from the globe.

The Qinghai-Tibet Plateau is the highest and the most recently formed plateau in the world. It is known as the “roof of the world” and the “third pole in the world”, and has been praised by the international scientific community as the “golden key to geodynamics”. The uplift of the plateau has had a great impact not only on the landscape, but also on the natural environment and human activities in adjacent areas.

The unique geographical environment of the Qinghai-Tibet Plateau attracts scholars from all over the world. Early understanding of Tibet by westerners originated from the accounts of the Kingdom of Tubo recorded by Marco Polo (1254-1324). This was the early regime established by ancient Tibetans on the Qinghai-Tibet Plateau, which lasted for more than 200 years. Since the 17th century, missionaries and explorers from Europe had been exploring the area of Tibet and drawing maps. As the upsurge of exploration in Central Asia from the late 19th century to the early 20th century, many Westerners had visited Tibet. However, for a long time, there was a lack of a comprehensive and systematic understanding of the natural conditions and resources of the Qinghai-Tibet region.

Apart from the southwest edge of the Qinghai-Tibet Plateau, which belonged to India, Pakistan, Nepal, Bhutan and Myanmar, most of the area was located in China. Thus, Chinese scholars had played an important role in the study of the Qinghai-Tibet Plateau. In the 1950s, the Chinese Academy of Sciences organized a “Tibet Survey Team” to carry out comprehensive investigations in geology and geography, agriculture, meteorology, social history, language, literature and art, medicine and health.

Since the 1970s, the Qinghai-Tibet Plateau has opened the prelude to large-scale scientific investigation. The Chinese Academy of Sciences had once again established a “comprehensive survey team for the Qinghai Tibet Plateau”, which included more than 50 professional scholars and involved many fields of geoscience, biology, economics and agriculture. More than 400 scholars had completed scientific investigations within the Tibet Autonomous Region over a period of seven years. The work time frame, the scale of the endeavour and the number of disciplines included were unprecedented. In 1992, the national climbing program “Research on the Formation and Evolution, Environmental Change and Ecosystem of the Qinghai-Tibet Plateau” was launched, and its achievements were displayed at the 30th IGC congress.

The achievements of Chinese scholars in scientific research on the Qinghai-Tibet Plateau had attracted worldwide attention. Therefore, after the Reform and Opening up (1978), several large-scale international conferences were held and international cooperations were established, which were mostly related to the Qinghai Tibet Plateau. The first large-scale international conference held in Beijing early after China’s reform was the “Qinghai-Tibet Plateau scientific seminar” in 1980. Since then, China jointly organized scientific investigations of the Qinghai-Tibet Plateau with France, Britain, Germany, Russia, Japan and the United States, respectively.

However, until the late 1990s, western scholars had few opportuni-

ties to engage in field investigation and research on the Qinghai-Tibet Plateau. Therefore, the 30th IGC not only aroused the interest of participating scholars in the presentations of the studies of the Qinghai Tibet Plateau, but also in one of the important itineraries to be undertaken during the congress field trips.

Field Trips

The team in charge of the geological field trips organized the routes considering the geology of mainland China and its characteristics, focusing on orogenic belts, large sedimentary basins, large metallogenic belts, Precambrian system, energy and minerals, etc. Since it was the first time that the IGC would be held in China, geological institutions all over China attached great importance to the field trips of the congress.

During the preparatory period of the congress, reports were compiled on more than 200 geological itineraries by local institutions as possible congress field trips. After these proposed field trips had been demonstrated to the Organizing Committee of the congress, 142 itineraries were identified as feasible field trips which covered almost all areas of mainland China (Fig. 4). However, the congress was held in August during the rainy season in China and due to continuous heavy rain in many areas and flash floods in some areas, some field trips were canceled.

According to the congress registration documentation, 79 field trips were finally offered to participants. The prominent theme of these itineraries was China’s continental geology and its features, focusing on major orogenic belts, large sedimentary basins, large metallogenic belts and other geological phenomena. A total of 1036 participants from 39 countries and regions took part in the field trips.

The organizers of geological field trips had also printed 84 travel guides. The field trip guides included the regional geological features, a geological evolutionary history, observations related to the geological itinerary, new studies of the main geological outcrops along the route, as well as existing research results, controversial topics and a bibliography of the main literature of the area to be covered by the field trips. The books also included inserted maps of the field trip routes. Therefore, these congress field trip guidebooks included not only geological travel guides, but also basic reference volumes for regional geological research.

Western China, especially Tibet and Xinjiang, was particularly attractive to foreign geologists (The 30th IGC Geo-tour Committee, 1994). The 30th IGC arranged several field trips in western China. Among them, the five field trips focusing on Tibet were the most attended, including “T387 Tibet Himalayan Geology” from Lhasa to Zhangmu, Tibet; “T388 Tibet geothermal geology” in the surrounding areas of Lhasa; “T389 Qinghai-Tibet Plateau early Pleistocene ice sheet and active structure” from Xining, Qinghai Province to Lhasa, Tibet; “T390 Golmud-Lhasa geological and geophysical survey” from Gelmud, Qinghai Province to Lhasa, and “T393 Tibet Salt Lake and epithermal deposit” from Chengdu, Sichuan Province to Lhasa.

These itineraries focused on geotectonics, geophysics, deposition structures, Quaternary geology, salt lakes, geothermal activity, glaciers, etc. The delegates also visited geothermal power plants and other relevant institutions during the field trips. Among them, the T390 field trip

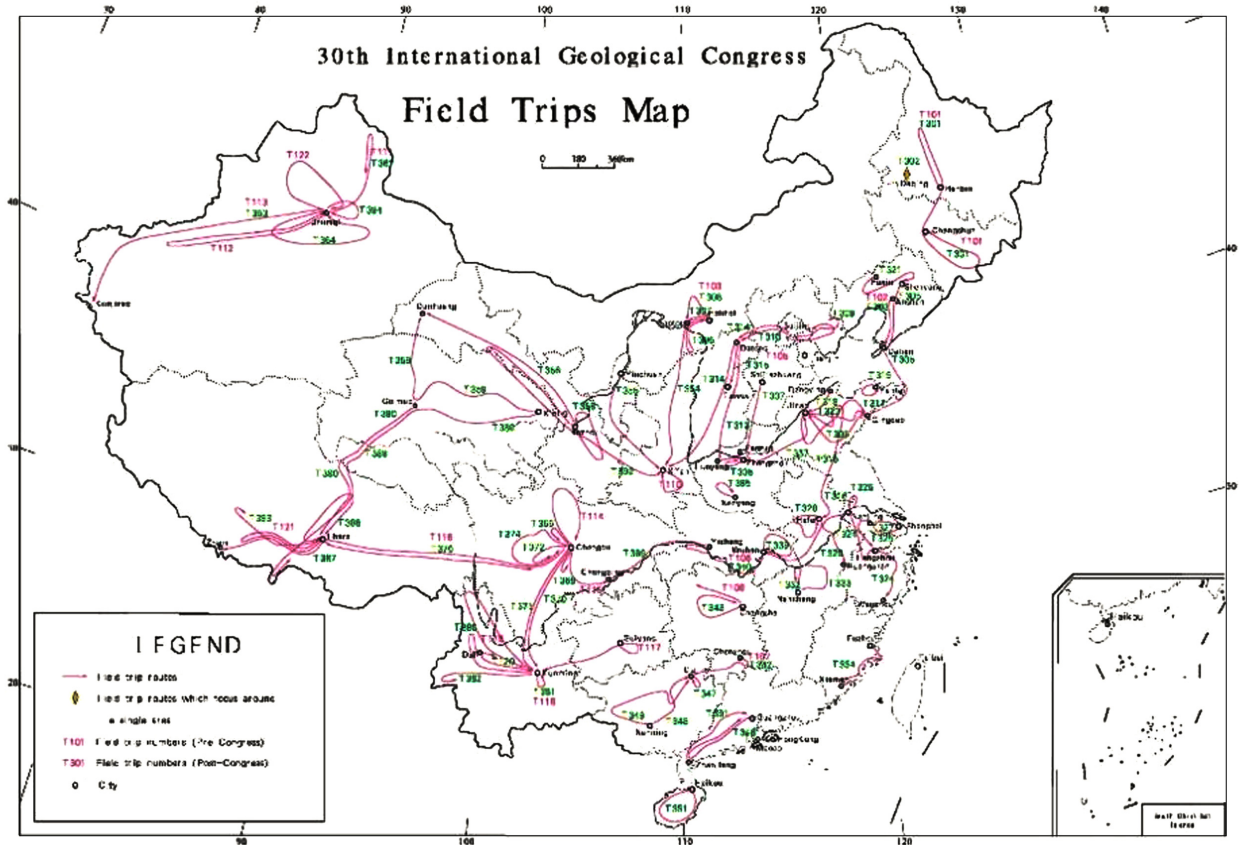


Figure 4. Field Trips Map.

was the route undertaken for the Sino-British Joint Inspection of the area in 1985, which traversed the main body of the Qinghai-Tibet Plateau. The congress field trip organizers provided the participating delegates with a variety of geophysical data in order to facilitate investigation and discussion of the lithospheric structure of the Qinghai-Tibet Plateau on site.

Among the many short field trips, the Zhoukoudian Peking Man Site trip (T203) in Beijing deserves special mention. Some scholars believe that this trip led to the birth of the concept of Geopark (Lyu, 2021). Zhoukoudian Peking Man Site is an important site of the Paleolithic Age in China and was listed in the World Cultural Heritage List in 1987. This is an ancient human site that has been excavated and studied by Chinese and foreign scholars since the early 20th century with the support of the Rockefeller Foundation. The discovery of Peking Man at Zhoukoudian is of epoch-making significance in the research field of human origin, because there are not only fossils of ancient apes found here, but also their cultural relics: stone tools and fire. Thus, homo erectus, which was called “ape man” at that time, was clearly classified as “human”. In August 1996, more than 60 Chinese and foreign geologists took part in the trip to Zhoukoudian. In July 2010, Guy Martini, UNESCO expert of geopark, pointed out in the mid-term evaluation of the world geoparks here: “The activities of the world geoparks originated from the trip to Zhoukoudian in Fangshan during the 30th International Geological Congress on August 6, 1996”.

GEOEXPO'96 Exhibition

The GEOEXPO'96 exhibition, which lasted six days in Beijing International Trade Center, was presented within three exhibition halls covering a total area of more than 7,500 m². The number of visitors reached about 40,000 and there were 180 exhibitors from 24 countries including scientific and educational institutions, geological surveys and companies, international oil, mining, and high-tech companies. The exhibition included posters reflecting the achievements of geological work, models, mineral, rock and fossil specimens, and advanced instruments and equipment.

China had shown many achievements in the study of fossil faunas in the Chengjiang area of Yunnan Province, isotopic dating techniques, and the formation and evolution of the Qinghai-Tibet Plateau, etc. The exhibition also included a more than 300 m² wall, display of a geoscientific map which was a compilation of a large number of maps of China reflecting basic geological surveys, geophysics, geochemistry, satellite and aerial remote sensing.

The model of the Zigong artesian well sunk in 1,835 won the “best model” prize of the congress exhibition. This well comprised four world records: the earliest anticline structure fixed well prospecting area; the earliest industrial development mine; the earliest birthplace of ton drilling; the earliest deep well exceeding 1000 m (Fig. 5).

Foreign companies exhibited global satellite positioning, three-dimensional image processing, high-precision testing and analysis

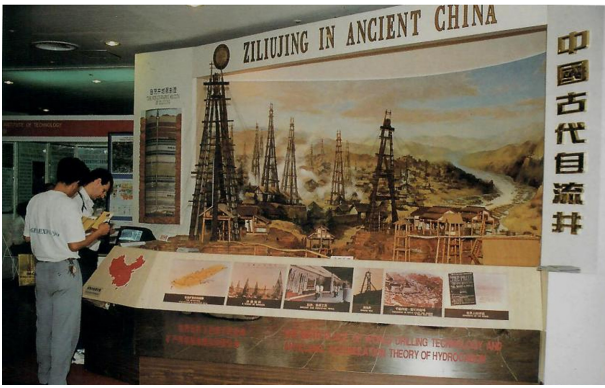


Figure 5. Model of an artesian well of ancient China.

instruments and other new technology products, seismic exploration image processing software, as well as the latest research achievements such as books and theses in the field of geology.

Conclusion

In the 1990s, against a background of a global geological recession, China's geological industry was also restricted by the dual impact of system reform and economic reform, as well as the lack of skills caused by the ten-year "Cultural Revolution" from 1966 to 1976. Consequently, the geological industry also came to a standstill.

At this congress, geologists from all over the world pointed out that Earth science, like other natural sciences, would flourish once again, and stressed that future work should focus on the following aspects: the search for more mineral resources and other natural resources to ensure the survival and development of mankind; the study of the spatial and temporal distribution and evolution of the geological environment, and strive to create a better living environment for mankind; accurately study geological disasters, establish mathematical models for disaster prediction, make contributions towards improving the lives of human beings.

The convening of the 30th IGC had also promoted geological research within China. In order to welcome the congress, some geological institutions funded and supported special research projects and published a number of geological works in English. Such as *The High-pressure and Ultrahigh-pressure Metamorphic Belt in East Qinling and Dabie Mountains, China* (Wang, 1999).

To welcome the 30th IGC, not only new buildings of the Geological Library and Geological Information Centre were rebuilt, but also the exhibition halls of the Geological Museum of China were rearranged. Rich and colorful geological science popularization activities were also arranged during the congress, which expanded the social impact of geology. In the first week of July before the congress, a film week and a photography exhibition on geosciences was held. A commemorative stamp (Fig. 6) and a silver commemorative medallion were issued during the congress; a song was specially composed for the 30th IGC (Fig. 7).

The 30th IGC had further promoted the internationalization of Chinese geology. It directly led to the scientific journal of the IUGS *Episodes* being hosted in China for 12 years and promoted Chinese



Figure 6. Commemorative stamp of the 30th IGC.

ETERNAL UNDERTAKING
永恒的事业

— Dedicated to the 30th International Geological Congress
— 献给第三十届国际地质大会

Words by: Wang Mily 王 群 力 斌
Music by: Lei Lu 雷 磊
English translation by: Wang Fingxin 王 峰 鑫 译
First sung by: Guo Moxin 关 牧 村 自 明

♩ = 83

Hand in hand we meet in the field fa-cing the strong winds
我们相 会 在 大 漠 荒 原， 迎 着 风 沙 手 握

Shoulder to shoulder we meet in the moun-tains. o-ver look-ing the white
手， 我 们 相 会 在 高 山 之 巅， 俯 看 白 云 层 林

clouds. Devoting our love we meet by the ri- vers to ex-ploit na-tural re-sour-ces in polar
层。 我 们 相 会 在 古 老 河 川， 开 发 资 源 献 出 爱 心。 我 们

re- gions we meet on i-cy snow which cre-ates sub- li-mi-ty Let history record our
相 会 在 极 地 天 险， 冰 雪 造 就 高 贵 与 纯 洁。 让 历 史 记 住

ga-ther-ing and also tell our chil- dren that the green glo- bal pro-tec-ting is our
今 天 也 告 诉 我 们 的 孩 子， 保 护 绿 色 的 地 球 是

e- ter-ml under-ta-king Let king
人 类 永 恒 的 事 业！ 让 业！

Figure 7. Congress song of the 30th IGC.

scholars to participate more in international cooperative research projects including IGCP. At the closing ceremony of the congress, N.P. Laverov, the deputy director of the Russian Academy of Sciences, presented the international geological Spendiarov Prize to the Chinese sedimentary geologist Liu Baojun (1931-).

The success of this congress was inseparable from the great attention paid to it by the Chinese government and the strong support of all sectors of society. The congress fund of 25 million was raised by donations from more than 80 government institutions, scientific research institutes, industrial enterprises, colleges and universities, foundations and more than 1700 individuals.

While the Congress received extensive support, it also had a widespread impact on all sectors of Chinese society, especially the geoscience community. On August 15, 1996, the *People's Daily* newspaper



Figure 8. Some of the newspapers and journals carrying the 30th IGC news.

published an editorial entitled *Building a Beautiful Home - Congratulating the Successful Closing of the 30th International Geological Congress* (Fig. 8). The congress had played an important role in expanding the international vision of China's geological community and letting the world know more about China.

After the congress, a total of 26 volumes of papers were published according to the presentations of the scientific sessions. The English versions were published by the Netherlands International Science Press (VSP) in 1997, and the Chinese versions were published by the Geological Press. The volumes provided geologists around the world with cutting-edge geological information (Li and Li, 1998).

Acknowledgement

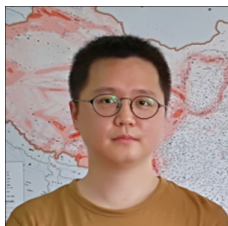
We would like to express our thanks to Director Li Chenyang of the National Geological Archives of China, Dr. Guo Lianjie of the Institute of Geology and Geophysics, the Chinese Academy of Sciences, and Wang Xueping of the National Geological Library of China, for their support in providing materials and helpful comments.

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