

THE INTERNATIONAL GEOLOGICAL CONGRESS, BEIJING, 1996

The 30th International Geological Congress (IGC) held in Beijing, China, the third Asian country to host this 'Olympic' between 4th and 14th August 1996, was the largest since the one first held in Paris in 1878. *Geoexpo'96* projected the latest progress in geological research and exploration technology with 180 exhibitors from over 22 countries participating in the exhibition. Nearly 7000 scientists from over 120 nations participated in the congress which provided both oral and poster presentations. There were 11 special symposia with 71 sessions and 22 symposia with 151 sessions. About 2730 papers were presented orally and 2129, in poster sessions. The registered participants were provided with 3 volumes of Abstracts and CD-ROM.

Inaugurating the congress, the Chinese Premier Li Peng dwelt on the conservation of natural resources and protection of the environment to sustain human survival and development.

Sixty women earth scientists from a dozen nations had an informal session on the role of women in geology. Tributes were paid to late Prof. Janet Watson who was a pioneer in bringing women into geology in the UK.

Dr. Robin Brett, newly elected President of the IUGS listed the major achievements of the century which included the formulation of the plate tectonic theory, study of the rocks from the Moon and the Mars, (particularly life on Mars), the role of geology in devising means at maintaining earth's environment, new methods of exploration and better understanding of the origin and evolution of life. He was optimistic that the 21st century would see better ways of predicting earthquakes and volcanic eruptions, and utilization of unconventional resources to replace currently depleting mineral resources.

Papers of Global Interest

Amongst papers from countries other than China, a few striking presentations in the emerging frontier areas were: An overall scenario of global sulphide deposits; multi-temporal absolute dating of tectonic events using zircons (new field called zirconology); genesis of diamond and its significance in understanding planetary evolution; structural control of volcanogenic ore deposits; rifts in intracontinental basins of Africa and associated magmatism and metallogeny; multi-source geoscience data processing, and automated on-site analysis for exploration.

Indian Participation in IGC

There were 40 participants from India. The various papers presented by them included topics on seismology, forecasting natural hazards, India's contribution to the making of the world geological map, Gondwanaland—its reconstruction and related aspects, the evolution of the Himalaya and its structural framework, metallogeny of gold and other precious metals from the Karnataka Craton, Proterozoic Sedimentary Basins and related Metallogeny of India, Flood Basalt Volcanism and Paleomagnetism. The publications of the Geological Society of India elicited keen interest in the *Geoexpo*.

Geological Research in China

The progress and achievements of China, in the field of geological research and education are spectacular. There are 100,000 geological professionals working in 10 industrial sectors. The Ministry of Geology and Mineral Resources (MGMR) is in charge of exploration programmes of the country. China leads the world in terms of proved resources in over 25 mineral deposits like lead, zinc, tungsten, rare earths, graphite and coal. Substantial progress has been achieved in hydrogeological and environmental geological research. New concepts such as 'tri-source metallogenesis' (a prognostic method based on ore, water and heat-source) have helped in locating new and important mineral deposits in China.



A Group of Indian delegates to the IGC

Gold in Greenstone Belts: Studies on the gold deposits in Chinese greenstone belts (Neo-Archaean to Palaeoproterozoic) suggest the formation of protolith of greenstone under high geothermal gradient. Primary gold occurs in arc-continent and continent-continent collision zones. There are also occurrences of gold associated with high alkali magmatism. The gold deposits are considered to be due to multi-source and multi-process metallogenesis. Most of China's gold comes not only from four large deposits, but mainly from a large number of mini-deposits which produce 500 kg and less of gold per year. Gold production in China is planned under the control of the Chinese National Gold Corporation which looks after all aspects of exploration and exploitation of gold.

Granite Geology: Granites of south China have been divided into six belts based on Sr, O and Nd-isotope data. The granites are either early Palaeozoic or Jurassic-Cretaceous. Five metallogenic series and their subseries related to granite magmatism have been identified, each characterised by a set of elemental assemblages.

Loess research: Loess deposits of China occupy an area of 450,000 km². Paleomagnetic dating of the loess-red clay boundary has been attempted. Thirty seven pairs of alternating loess and palaeosol suggest alternating cold-dry periods of loess formation and warm-wet periods of palaeosol development.

Hydrogeology: In the field of hydrogeology a distinct correlation has been established between chloride ion concentration, draw-down and yield in the coastal urban parts of China. More than two thirds of the country has been covered by regional hydrogeological surveys. For a total annual precipitation of $6 \times 12^{12} \text{ m}^3$ for the whole country, the total annual recharge is estimated at $8716 \times 10^8 \text{ m}^3/\text{year}$.

Geochronology: There has been rapid progress since 1985 in the field of isotope-geochemistry and geochronology. Using U-Pb, Sm-Nd and Rb-Sr techniques three exhumation stages of the ultrahigh pressure (UHP) rocks (Late Permian-Early Triassic) of Dabie Mountains have been identified: first between 240 and 220 Ma, second between 220 and 150 Ma and third at 150 Ma.

Geological Education in China: China has 98 geoscientific research institutions with about 21,000 professionals carrying out research in diverse field of study. About 1000 research projects get completed every year. There are eight universities such as the Chinese University of Geosciences with a strength of over 5000 students besides 53 other institutions of higher learning catering to various geoscience specialities and geological secondary schools. Further, the Ministry of Geology and Geological Society of China regularly arrange summer camps for youngsters interested in geology. At the time of the Congress more than 200 school children from China and other countries participated in special geological trips arranged for them.

Workshop on Seismology

A three day pre-IGC workshop on seismology and physics of the earth's interior was held during 1-3 August, 1996 at Tangshan under the chairmanship of Dr. Harsh K. Gupta. Recent severe earthquakes in Asia-Pacific region and steps to mitigate loss of life and property were discussed in detail.

Field Trips

Seventy eight field trips were arranged during the Congress to different parts of China to cover regions of geological interest. It was possible to participate in only two of the trips, one in Hebei province and the other in Shandong province. Jinchangyen gold deposit belt where gold occurs in Archaean high-grade metamorphic rocks (in quartz veins/veinlets and as dissemination), in ductile shear zone stretching for 10-20 km was visited. The deposit bears the imprint of Mesozoic magmatic hydrothermal fluids. Other deposits were the Shirengon iron ore deposit (magnetite quartzite) of Archaean age producing one million tons per year. The Fe content is 31%.

In Shandong province gold occurs in late Archaean Jiaodong Group. The isotopic ages range between 2945 Ma and 2407 Ma. Pre-, syn-, and post-tectonic features associated with mineralization have been identified. The metamorphics have been intruded by two facies of granitoid massifs. There are over 300 dykes of pegmatite porphyrites and lamprophyres. The granitoid massifs form the wall rocks of gold deposits in the region. It is believed that the intermediate to basic dykes have a spatial and temporal relationship with gold deposits. In the Jinoja gold field north of Zhaoyuan city, gold occurs at the contact between the Linglong gneissic granite and the Jiaodong metamorphics.

Besides the major gold mine, there are a number of smaller workings all along the gold belt. All beneficiation and metallurgical operations are done at one central place. Workers are drawn from near by villages and mining operations are under the control of the Mayor of the town.

Lessons to learn

Many gold mines in China form a cluster of small deposits and mining is effectively carried out utilizing local labour and expertise under the control of a National Gold Corporation. A similar approach could be attempted in our country also.

Taking a clue from the demarcation of granite bodies and related mineralization attempted in China, it is desirable to carry out a thorough investigations of the granite plutons of peninsular and extra peninsular India for possible identification of mineralisation belts.

In order to improve the quality of geological education, as in China, it is necessary to pick up the best talent at an early age at the secondary school level. Updating of the resource potential and mining without polluting the environment are possible only through a team of well trained experts in earth sciences with strong foundation in basic sciences.

We can emulate the Chinese practice of preparation of geological, structural and metallogenic maps jointly by personnel drawn from Universities, Geological Surveys and Mining companies.

Topographic, geological and geophysical maps are made available to students and professionals alike without any difficulty in China. It is time, authorities in this country take steps to remove all restrictions in the dissemination of knowledge.

The present day rapid progress in geological research and education in China and in other developed countries can be attributed to the participation of the industry in the educational programmes and support to industry oriented research.

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