Prepared for the World Academy of Sciences

Curriculum Vitae

Jian Zhao (Jet) Yin

Ph.D., P.Geo., Professor

The Greater Vancouver, BC, Canada

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October 17, 2025

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Note: *Containing 21 images and one table of the CV owner's various representative certificates, publications, and related content*

CONTACT INFORMATION

Jian Zhao Yin
;
Homepage: https://orcid.org/0000-0003-3025-7299

EDUCATION

British Columbia Institute of Technology (BCIT), Burnaby, Canada
Trained in mining technology 2004

China University of Geosciences, Beijing, China
Ph.D. in geology of mineral deposits 1993

College of Earth Sciences, Jilin University, Changchun, China
M.Sc in geology of mineral deposits 1989

College of Earth Sciences, Jilin University, Changchun, China
B.Eng in geology of mineral exploration 1986

EMPLOYMENT

Principal Geologist
Orient Resources Ltd., Canada 2023-present

Part-time Professor
College of Earth Sciences, Jilin University 2021-present

Guest Professor
Wuhan Institute of Technology, China 2022-2025

Geology Manager
Hochschild Mining Canada PLC, Britain 2022-2023

VP Exploration
Silver Metals Inc., Canada 2017-2018

Chief Geologist & Exploration Manager
Barkerville Gold Mines Ltd., Canada 2004-2015

Chief Geologist & Project Representative
Pan Asia Mining Corp., Canada 2000-2003

Senior Geologist & China Project Representative
Quantum Resources Ltd., Australia 1998-2000

Associate Research Professor
Institute of Mineral Resources, Chinese Academy of Geological Sciences,
Beijing, China 1995-1997

Postdoctoral in geology of mineral deposits
Chinese Academy of Geological Sciences,
Beijing, China 1993-1995

Geological Engineer
Geological Bureau of Jilin Province, China 1989-1990

ACADEMIC AND MINERAL EXPLORATION-MINING HIGHLIGHTS

I, JZ Yin, am engaged in both theoretical research in earth sciences (such as mineral prospecting and exploration geology, ore deposit geology, crystallography and mineralogy, ore deposit geochemistry, and mining technology), as well as practical work including mineral exploration and mining. I have served in senior technical management positions such as Vice President of Exploration, Chief Geologist, Geology Manager, and Senior Exploration Manager for relevant mining companies in Canada and abroad.

I am a prolific author of monographs (including co-authorship) on topics such as mineral deposit geology, crystallography and mineralogy, ore deposit geochemistry, mineral resources and the environment, and other related fields (Figures 1-4). I have published more than 135 research

papers in both English and Chinese across numerous international academic journals. In addition, I have compiled more than ten Canadian NI 43-101 technical reports and annual geological exploration assessment reports.

For more detailed information of most, if not all of my representative academic works, please visit my following home website:

https://orcid.org/0000-0003-3025-7299.

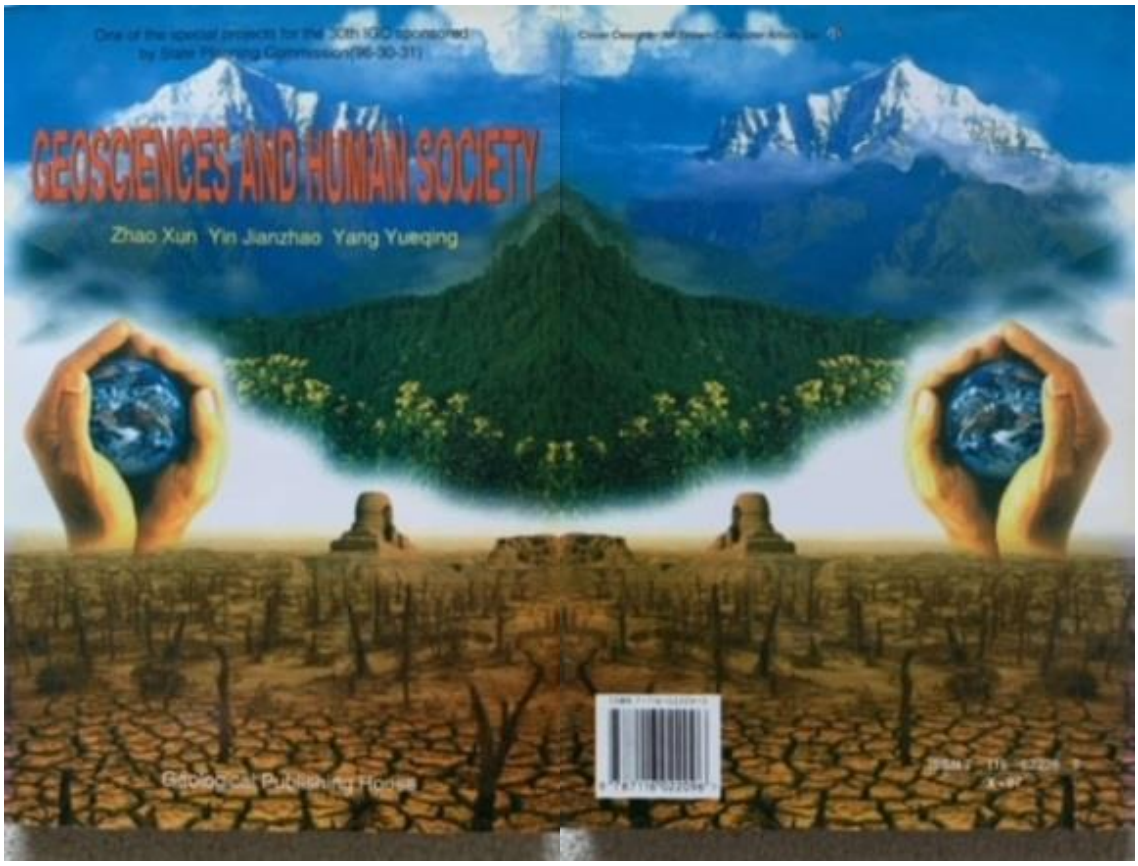


Figure 1. Cover of the monograph *Geosciences and Human Society* by me and my co-authors

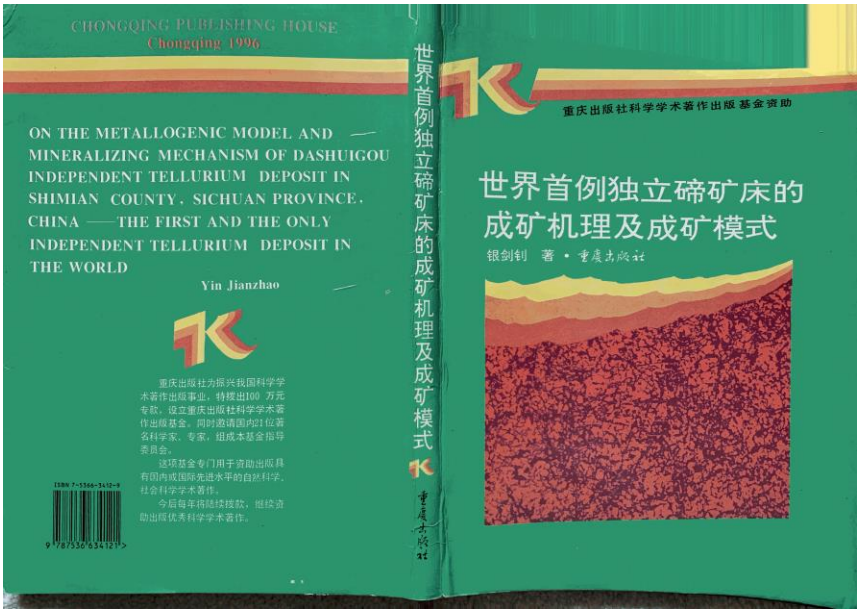


Figure 2. Cover of the monograph *On the Metallogenic Model and Mineralizing Mechanism of Dashuigou Independent Tellurium Deposit in Shimian County, Sichuan Province, China—the First and Only Independent Tellurium Deposit in the World* by myself

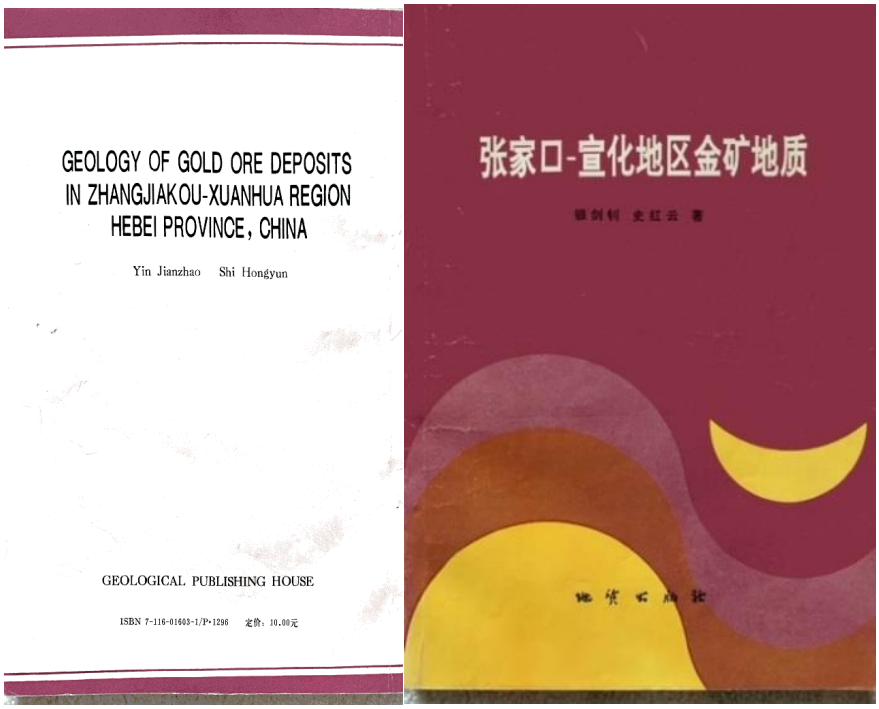


Figure 3. Cover of the monograph *Geology of Gold Deposits in Zhangjiakou-Xuanhua Region, Hebei Province, China* by me and my co-author

In my more than 30 years of research and practical experience, I have put forward several unique insights into the areas of metallogenic theory, crystallography and mineralogy, and isotope geochemistry of various solid minerals such as early Precambrian lode and late orogenic gold deposits and other metals as well as rare elements such as tellurium, diamonds and non-metallic building materials. I am also passionate about mineral exploration and development, the history of geological sciences, mineral resources and the environment, especially as it related to the sustainable development of human society (Figures 4-5).

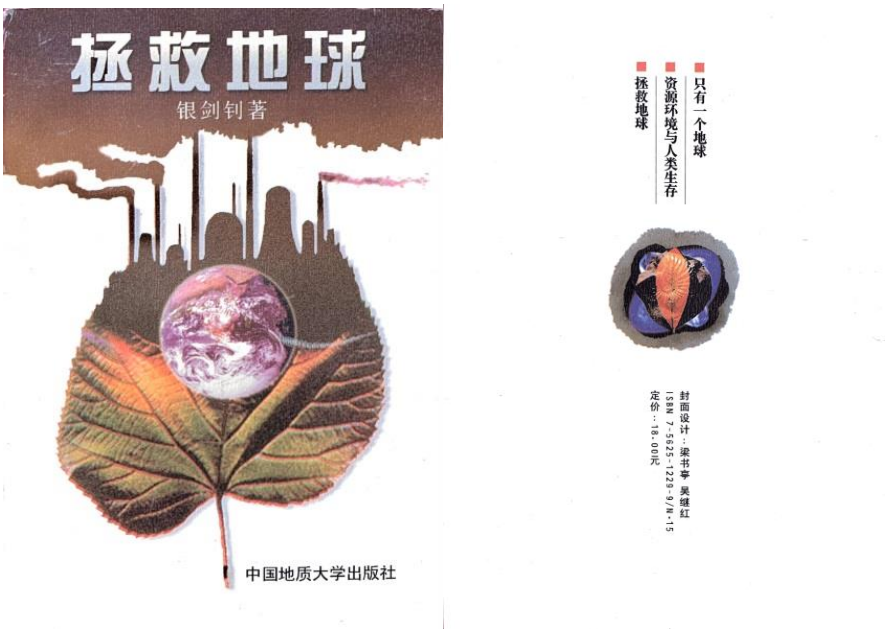


Figure 4. Cover of the first edition of the book titled *Save the Earth* by me

Of particular note, as Chief Geologist and Exploration Manager for a publicly listed Canadian mining company, I led highly successful gold exploration projects in the Cariboo Mining District of western Canada*. Not only did I leverage large-scale trenching to discover a series of brand new gold mineralized zones, including the Old Shaft Zone and the Pit Vein Zone, but I also significantly increased the gold resources and reserves of the abandoned, older mines in the region. According to the latest NI 43-101 report issued by the mines' current owners, they "expect to produce approximately 1.89 million ounces of gold over a 10-year mine life, with an after-tax NPV 5% of C$943 million and a 22.1% IRR at a US$2,400/oz gold price (after-tax NPV 5% of C$2,066 million and a 38.0% IRR at a US$3,300/oz gold price)." This is a typical example of my successful integration of geological theory with mineral exploration and development, supported development of the local economy and also increased employment in the region. The following sections will elaborate on this point.

*Note: The Cariboo Mining District is the premier placer gold mining region of British Columbia, located in the province's central interior near Wells-Barkerville. It was the site of a major gold rush starting towards the end of the 1850s with discoveries on Williams Creek, and continues to be an area of interest for gold mining to the present.

Figure 5. Cover (above) and title page (below) of the book *Save the Earth* by me (reprint edition)

My academic innovations and contributions to Mineralogy Deposit Geology, Crystallography and Mineralogy, Mineral Deposit Geochemistry, Mineral Prospecting, Exploration and Mining, as well as natural resources and the environment include:

1. Based on my more than 10 years of experience in mineral prospecting, exploration, and gold mine development in this region, I have for the first time delineated the metallogenic series and subseries of endogenous gold deposits in the Cariboo Mining District, a renowned gold-producing region in western Canada (Table 1). These series include the pyrite replacement series (which is further divided into the limestone subseries and clastic rock subseries), the quartz vein/veinlet-stockwork series (which is further divided into the strike vein, diagonal vein, orthogonal vein, quart veinlet, and quartz stockwork subseries), the basalt-hosted gold-bearing pyrrhotite lode gold series, and the associated gold in porphyry copper series. This is the first delineation of gold mineralization series by a geologist in Canada, and lays a solid foundation for

the exploration and development of gold deposits in this region, as well as for the discovery of similar deposits in areas with comparable geological settings. The representative article is as follows:

Table 1. Metallogenic series/subseries of gold deposits in the Cariboo Mining district, BC, Canada

Metallogenic Series	Sub Metallogenic Series	Representative Gold Deposit
Pyrite replacement series	Limestone subseries	Island and Cow Mountains
	Clastic rock subseries	Bonanza Ledge on the Barkerville Mountain
Quartz vein/veinlet-stockwork series	Strike vein subseries	BC Vein on the Barkerville Mountain
	Diagonal vein subseries	Cow and Barkerville Mountains
	Orthogonal vein subseries	Island, Cow and Barkerville Mountains
	Quart veinlet subseries	Island, Cow and Barkerville Mountains, Mt. Proserpine
	Quart stockwork subseries	Island, Cow and Barkerville Mountains, Mt. Proserpine
basalt-hosted gold-bearing pyrrhotite lode gold series	N/A	QR gold Mine
associated gold in porphyry copper series	N/A	Mount Polly porphyry copper-gold Mine

代表性文章如下：

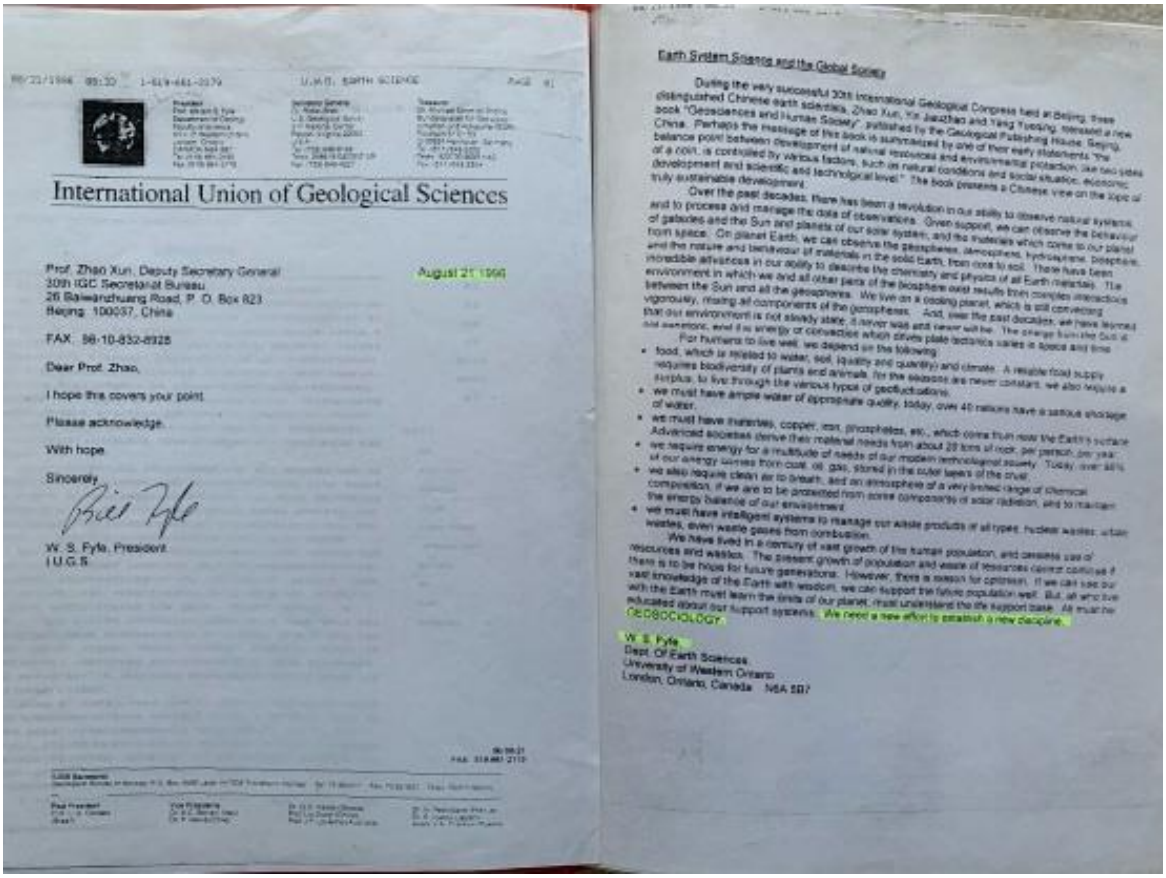
- **JZ Yin**. 2018a. Metallogenic series of gold deposits in the Cariboo mining district, British Columbia, Canada. *Earth Sciences*, 7 (1): 17-22. DOI: 10.11648/j.earth.20180701.14.

2. I proposed for the first time a new idea of "nano-effect enrichment metallogeny" or nanometallogeny of rare elements, as well as new insights into nano-effect mineral deposit geo-science. Representative academic works that gradually deepen this understanding are as follows:

- **JZ Yin**. 1994m. Nano-effect enrichment metallogeny. *Earth Science Frontiers*, 1 (4): 8 (in Chinese with English abstract).
- **JZ Yin**. 1996. *On the Metallogenic Model and Mineralization Mechanism of the World's First Independent Tellurium Deposit*. Chongqing: Chongqing Publishing House (*Supported by Chongqing Scientific and Academic Book Publishing Fund, China*) (198 pages, in Chinese with English abstract. Figure 2).
- **JZ Yin**. 1996a. The metallogenic model and mineralizing mechanism of the Dashuigou independent tellurium deposit in Shimian County, Sichuan, China - the first and only independent tellurium deposit in the world. *Acta Geoscientia Sinica*, special issue: 93-97.
- **JZ Yin**. 1996e. On nano-effect enrichment metallogeny of rare metal mineral deposits. In: *Abstracts of 30th IGC*, Vol. 2: 721.
- **JZ Yin** and HY Shi. 2019b. Nano effect mineralization of rare elements - taking the Dashuigou tellurium deposit, Tibet Plateau, Southwest China as the example. *Academia Journal of Scientific Research (AJSR)*, 7 (11): 635-642. DOI: 10.15413/ajsr.2019.0902.

- **JZ Yin**, SP Xiang, YH Chao, HY Yin and HY Shi. 2023a. Petrochemical eigenvalues and diagrams for the identification of metamorphic rocks' protolith, taking the host rocks of the Dashuigou tellurium deposit in China as an example. *Acta Geochimica*, 42 (1): 103-124. DOI: 10.1007/s11631-022-00583-6.
- **JZ Yin** and Luc English. Nanometallogeny. *Nature Geoscience*, Just submitted online.

3. As the principal author and acting project leader, I collaborated with other researchers to publish the English monograph *Geosciences and Human Societies* (Figure 1). On the occasion of the 30th International Geological Congress held in Beijing, China, the book was recognized by famed geologist W. S. Fyfe, then president of the International Union of Geological Sciences and professor at the University of Western Ontario (Figure 6). Additional recognition was given by well-known British environmental geologist and professor at the University of Cambridge Dr. Nigel Woodcock, and Professor M. G. Wolman of the Department of Geography and Environmental Engineering at Johns Hopkins University in the United States (Figure 7).



International Union of Geological Sciences

Prof. Zhao Xun, Deputy Secretary General
30th IGC Secretariat Bureau
26 Baiwanzhuang Road, P. O. Box 823
Beijing, 100037, China

August 21, 1996

FAX: 86-10-832-6928

Dear Prof. Zhao,

I hope this covers your point.

Please acknowledge.

With hope

Sincerely,

W. S. Fyfe, President
I.U.G.S.

Earth System Science and the Global Society

During the very successful 30th International Geological Congress held at Beijing, three distinguished Chinese earth scientists, Zhao Xun, Yin Jianzhao and Yang Tuosing, released a new book "Geosciences and Human Society", published by the Geological Publishing House, Beijing, China. Perhaps the message of the book is summarized by one of their early statements "the balance point between development of natural resources and environmental protection, like two sides of a coin, is controlled by various factors, such as natural conditions and social situation, economic development and scientific and technological level." The book presents a Chinese view on the topic of truly sustainable development.

Over the past decades, there has been a revolution in our ability to observe natural systems and to process and manage the data of observations. Given support, we can observe the behaviour of galaxies and the Sun and planets of our solar system, and the materials which come to our planet from space. On planet Earth, we can observe the geospheres, atmosphere, hydrosphere, biosphere, and the nature and behaviour of materials in the solid Earth, from core to soil. There have been incredible advances in our ability to describe the chemistry and physics of all Earth materials. The environment in which we and all other parts of the biosphere exist results from complex interactions between the Sun and all the geospheres. We live on a cooling planet, which is still convecting vigorously, moving all components of the geospheres. And, over the past decades, we have learned that our environment is not steady state, it never was and never will be. The energy from the Sun is not constant, and it is energy or convection which drives plate tectonics varies in space and time.

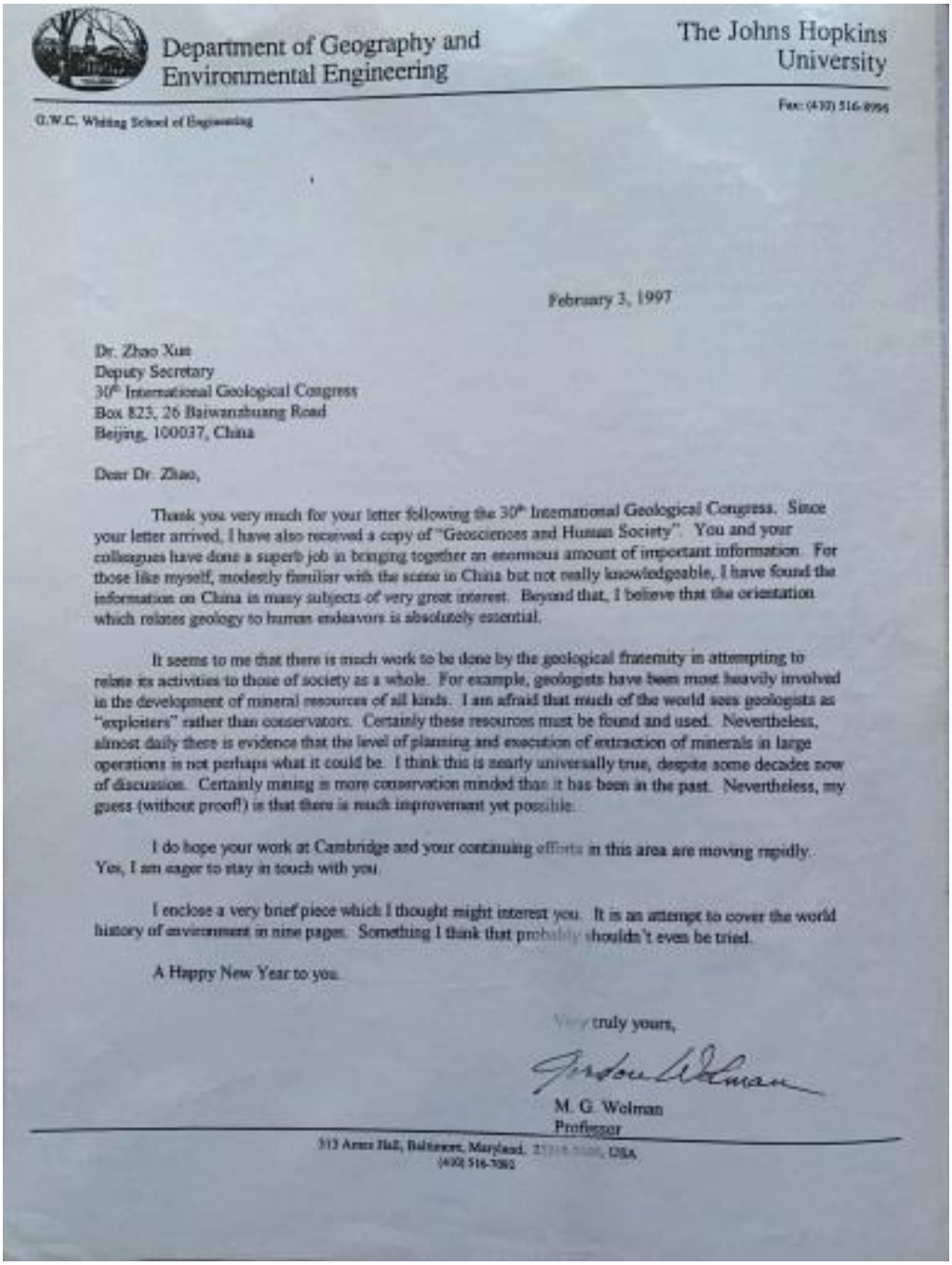
For humans to live well, we depend on the following:

- food, which is related to water, soil, aquatic and quarterly and climate. A reliable food supply requires biodiversity of plants and animals, for the seasons are never constant, we also require a surplus, to live through the various types of perturbations.
- we must have ample water of appropriate quality, today, over 40 nations have a serious shortage of water.
- we must have nutrients, copper, iron, phosphates, etc., which come from near the Earth's surface. Advanced societies derive their material needs from about 20 tons of rock per person per year.
- we require energy for a multitude of needs of our modern technological society. Today, over 80% of our energy comes from coal, oil, gas, stored in the outer layers of the crust.
- we also require clean air to breath, and an atmosphere of a very limited range of chemical composition, if we are to be protected from some components of solar radiation, and to maintain the energy balance of our environment.
- we must have intelligent systems to manage our waste products of all types: nuclear wastes, urban wastes, even waste gases from combustion.

We have lived in a century of vast growth of the human population, and ceaseless use of resources and wastes. The present growth of population and waste of resources cannot continue if there is to be hope for future generations. However, there is reason for optimism. If we can use our vast knowledge of the Earth with wisdom, we can support the future population well. But, all who live with the Earth must learn the limits of our planet, must understand the life support base. All must be educated about our support systems. We need a new effort to establish a new discipline, GEOSOCIOLOGY.

W. S. Fyfe
Dept. Of Earth Sciences
University of Western Ontario
London, Ontario, Canada N6A 5B7

Figure 6. A digitized copy of Professor W. S. Fyfe's evaluation of the monograph *Geosciences and Human Societies* by me and my co-authors



Department of Geography and Environmental Engineering
The Johns Hopkins University
G.W.C. Whiting School of Engineering
Fax: (410) 516-8996

February 3, 1997

Dr. Zhao Xun
Deputy Secretary
30th International Geological Congress
Box 823, 26 Baiwanzhuang Road
Beijing, 100037, China

Dear Dr. Zhao,

Thank you very much for your letter following the 30th International Geological Congress. Since your letter arrived, I have also received a copy of "Geosciences and Human Society". You and your colleagues have done a superb job in bringing together an enormous amount of important information. For those like myself, modestly familiar with the scene in China but not really knowledgeable, I have found the information on China in many subjects of very great interest. Beyond that, I believe that the orientation which relates geology to human endeavors is absolutely essential.

It seems to me that there is much work to be done by the geological fraternity in attempting to relate its activities to those of society as a whole. For example, geologists have been most heavily involved in the development of mineral resources of all kinds. I am afraid that much of the world sees geologists as "exploiters" rather than conservators. Certainly these resources must be found and used. Nevertheless, almost daily there is evidence that the level of planning and execution of extraction of minerals in large operations is not perhaps what it could be. I think this is nearly universally true, despite some decades now of discussion. Certainly mining is more conservation minded than it has been in the past. Nevertheless, my guess (without proof!) is that there is much improvement yet possible.

I do hope your work at Cambridge and your continuing efforts in this area are moving rapidly. Yes, I am eager to stay in touch with you.

I enclose a very brief piece which I thought might interest you. It is an attempt to cover the world history of environment in nine pages. Something I think that probably shouldn't even be tried.

A Happy New Year to you.

Very truly yours,

M. G. Wolman
Professor

313 Ames Hall, Baltimore, Maryland, [illegible], USA
(410) 516-7382

Figure 7. A digitized copy of Professor M. G. Wolman's evaluation of the monograph *Geosciences and Human Societies* by me and my co-authors

Dr. Woodcock commented on December 11, 1996 on *Geosciences and Human Society*, noting that it is "a most valuable summary of Chinese opinion on geo-environmental matters". Professor Wolman believes (February 3, 1997, Figure 7) that *Geosciences and Human Society* has "done a superb job in bringing together an enormous amount of important information"……"I have

found the information on China in many subjects of very great interest. Beyond that, I believe that the orientation which relates geology to human endeavors is absolutely essential."

The core content and related evaluations of this monograph can be found in the following progressive academic papers:

- X Zhao, **JZ Yin** and YQ Yang. 1996. Social geology - a new interdisciplinary subject. *China Geology*, (5): 14-16 (in Chinese with English abstract).
- X Zhao, **JZ Yin** and YQ Yang. 1996. An emerging interdisciplinary subject**.** *Uranium Geology*, 12 (4): 193-196 (in Chinese with English abstract).
- X Zhao, **JZ Yin** and YQ Yang. 1997. Social geology. *Geological Reviews*, 43 (1): 64-68 (in Chinese with English abstract).
- X Zhao, **JZ Yin** and YQ Yang. 1997. Sociogeoscience: the truly sustainable development. *Advance in Earth Science Engineering*, 14 (1-2): 8-13 (in Chinese with English abstract).
- X Zhao, **JZ Yin** and YQ Yang. 1997. Sustainable geology: Sociogeoscience. *Episodes*, 20 (2): 84-88.

4. As the specific person in charge of project implementation, I attempted to find an optimal balance between economic development in mining development versus resource and environmental protection. To this end, I and my two colleagues jointly proposed the new concept of "Social Geology", which attracted the attention of relevant experts in China and abroad. When commenting on the book *Geosciences and Human Society* on August 21, 1996, Professor W. S. Fyfe pointed out (Figure 6): "The book presents a Chinese view on the topic of truly sustainable development." He further emphasized that we need to work hard to establish a new discipline-social geology.

As Chinese scholar and professor, Juxiang Dong wrote to the authors of this monograph: "I recently read your article on social geology in the magazine *China Geology* and was very interested! I think your article is the first in China to draw the attention of the academic community to an important subject field. I think your insights are extremely valuable. This is a major cross-century topic. I think it will exceed the significance you have given it. Its significance lies in its impact on social development. I think it may not be limited to earth sciences. If it is just a wonder in the tree of earth sciences, it seems to underestimate its significance and prospects. I hope that this topic can make more people in the academic community and society understand and care about it, so that it can be enriched and developed through discussion, and a new field with Chinese characteristics and achievements made by Chinese scholars can be developed." Representative works on this point are the same as in Section 3 above.

5. For the first time, the EPR spectroscopy was used by me and my collaborators to prove the existence of lattice gold in quartz and pyrite, the main gold-bearing minerals in many gold deposits in Zhangjiakou, Hebei Province, China and in the world. This provided a theoretical basis for improving the recovery rate of gold ore processing, thereby making full use of the ore and supporting environmental protection when developing gold deposits around the world. A representative series of progressive works on this point are as follows:

- **JZ Yin** and HY Shi. 1994a. Typomorphic characteristics of pyrite from the Zhangquanzhuang gold deposit in Hebei Province, China and its genetic significance. *Gold*, 15 (1): 6-11 (in Chinese with English abstract).

- **JZ Yin** and HY Shi. 1994b. Typomorphic characteristics of quartz from the Zhangjiakou gold deposit in Hebei, China and its genetic significance. *Petrology and Mineralogy*, 13 (1): 78-89 (in Chinese with English abstract).
- **JZ Yin** and HY Shi. 1994c. Electron paramagnetic resonance (EPR) study of quartz from the Zhangjiakou gold mine in Hebei Province. *Mineralogy and Petrology*, 14 (1): 11-17 (in Chinese with English abstract).
- **JZ Yin** and HY Shi. 1994d. Mineralogical characteristics of different types of gold deposits in Zhangjiakou-Xuanhua area, Hebei, China. *Nonferrous Metal Mineral Resources and Exploration*, 3 (2): 122-127 (in Chinese with English abstract).
- **JZ Yin** and HY Shi. 1994p. Mineralogical characteristics of quartz from the Zhangquanzhuang gold deposit in north-western Hebei, China. *Modern Geology*, 8 (4): 459-465 (in Chinese with English abstract).
- HY Shi and **JZ Yin**. 1994. Study on the electron paramagnetic resonance spectrum of pyrite in Zhangjiakou gold deposit, Hebei. *Geological Prospecting Collection*, 9 (1): 87-93 (in Chinese with English abstract).
- **JZ Yin** and HY Shi. 1995. Geology of Gold Ore Deposits in Zhangjiakou-Xuanhua Region, Hebei Province, China. Beijing: Geological Publishing House. 131 pages (Figure 3, in Chinese with English abstract).
- **JZ Yin**, Y Liu and HY Shi. 2021a. Chemical and physical characteristics of quartz from gold deposits in the North China platform: relationship to gold mineralization. *Acta Geochimica*, 40 (6), 998-1022. DOI: 10.1007/s11631-021-00487-x.
- **JZ Yin**, Y Sun, HY Yin, HY Shi, Sparling J, Chao YH and Xiang SP. 2023b. Correlations between trace elements in pyrite and gold mineralization of gold deposits on the North China platform. *Acta Geochimica*, 42 (6): 1079-1103. DOI: 10.1007/s11631-023-00636-4.

6. I further proposed the "tristage gold ore source beds evolution metallogenic model" for the formation of lode gold deposits in the Archean basement and created new concepts of “the original gold ore source bed”, "the intermediate gold ore source bed", and "the final gold ore source bed". Representative academic papers on this point are as follows:

- **JZ Yin**, YS Zhai and SC Chi. 1993f. The evolutionary model of the tristage ore source beds: a new model for the formation of lode gold deposits in the Archean basement. In: Ore Deposits Committee of the Geological Society of China (Editor). *Proceedings of the Fifth China National Ore Deposits Conference*. Beijing: Geological Publishing House. 341-342.
- **JZ Yin** and HY Shi. 1995. *Geology of Gold Ore Deposits in Zhangjiakou-Xuanhua Region, Hebei Province, China*. Beijing: Geological Publishing House. 131 pages (Figure. 3, in Chinese with English abstract).
- **JZ Yin**. 1995c. A new metallogenic model of lode gold metallogeny in the Archean basement of North China. *North China Journal of Geology and Mineral Resources*, 10 (1): 99-108.

7. For the first time, I and my colleagues analyzed the reflectivity of the very rare minerals tetradymite and tsumoite under the international standard light waves and their microscopic indentation hardness. Additional results were obtained on the two minerals’ sulfur and lead isotopes and origins, chemical compositions, and their chemical formulas were further determined. The following are representative progressive works on this point:

- **JZ Yin**. 1996. *On the Metallogenic Model and Mineralization Mechanism of the World's First Independent Tellurium Deposit*. Chongqing: Chongqing Publishing House (Supported by Chongqing Scientific and Academic Book Publishing Fund) (198 pages, in Chinese with English abstract. Figure 2).
- **JZ Yin**. 1996c. Supplementary data on the mineralogy of tetradymite. *Bulletin of Mineralogy, Petrology and Geochemistry*, 15 (4): 246-248.
- **JZ Yin**. 1997a. New mineralogical data on tetradymite from the Dashuigou independent tellurium deposit in Shimian County, Sichuan Province, China. *Advance in Earth Science Engineering*, 14（1-2）: 86-92.

- **JZ Yin** and HY Shi. 2020a. Mineralogy and stable Isotopes of tetradymite from the Dashuigou tellurium deposit, Tibet Plateau, Southwest China. *Scientific Reports*, 10: 4634 | hppts://doi.org/10.1038/s41598-020-61581-3. www.nature.com/scientificreports.
- **JZ Yin** and HY Shi. 2020b. Mineralogy of tsumoite based on samples from the Dashuigou tellurium deposit, Tibet plateau, China. *Geological Society of America Abstracts with Programs*. Vol. 52, No. 6, 2020. DOI: 10.1130/abs/2020AM-349615.
- **JZ Yin** and HY Shi. 2025c. New Data on the crystallography and mineralogy of tsumoite. *Iris On Journ of Sci*, 1 (4). DOI: http://dx.doi.org/10.33552/IOJS.2025.01.000520.
- **JZ Yin,** Yuhong Chao, Kuinuan Li, Hongyun Shi and Haoyu Yin. 2025e. Isotopic constraints on the origin of the Dashuigou tellurium deposit, Tibetan Plateau: insights from Si, S, and Pb isotopes. *Arabian Journal of Geosciences* (under review).

8. For the first time, I and my colleagues tested and published a new set of X-ray powder diffraction data for the rare minerals tetradymite and tsumoite, correcting the errors of previous studies on them. Also for the first time, I obtained a batch of thermoelectric coefficient data of tetradymite single minerals, and explored the thermoelectric characteristics of tetradymite and its relationship with the formation of the ore deposit. The following are representative progressive works on this point:

- **JZ Yin** and HY Shi. 2020a. Mineralogy and stable isotopes of tetradymite from the Dashuigou tellurium deposit, Tibet Plateau, Southwest China. *Scientific Reports*, 10: 4634 | hppts://doi.org/10.1038/s41598-020-61581-3. www.nature.com/scientificreports.
- **JZ Yin** and HY Shi. 2020b. Mineralogy of tsumoite based on samples from the Dashuigou tellurium deposit, Tibet Plateau, China. *Geological Society of America Abstracts with Programs*. 52 (6), 2020. DOI: 10.1130/abs/2020AM-349615.
- **JZ Yin** and HY Shi. 2025c. New Data on the crystallography and mineralogy of tsumoite. Iris On Journ of Sci. 1 (4). DOI: http://dx.doi.org/10.33552/IOJS.2025.01.000520.

9. In practical mineral prospecting, exploration and mining, I served as the Chief Geologist, Exploration Manager, Acting VP Exploration, and as-needed Mine Manager for a publicly listed mining company in Canada. Working in these roles from 2004 to 2015, I made a series of geologically significant discoveries, including a number of brand new gold mineralized zones. I led my team to carry out a series of trench exploration and drilling activities across Mosquito Creek, Island Mountain, Cow Mountain, Barkerville Mountain, Mount Prosperpine, and Cunningham Creek in central British Columbia, Canada, which were within the properties of the Company.

In 2012 alone, my team collected a total of 3,759 channel samples between the Cariboo Mining District at Barkerville Mountain (2,429 channel samples collected, with sample grades as high as 167.42-181.85 g/t gold), Cow Mountain (a total of 1,253 channel samples collected, with sample grades as high as 64.89-107.37 g/t gold) and Island Mountain including Mosquito Creek (an incomplete count of 77 channel samples collected, with sample grades as high as 106.67-176.20 g/t gold). These extensive activities resulted in the discovery of new quartz veins and quartz stockwork gold mineralized zones, including the Old Shaft Zone and Pit Vein Zone, among many others. Included within these was a weighted result from a continuous channel sampling set in the Old Shaft Zone on Barkerville Mt., which was 18.56 g/t over 60.0 feet (the thickness and corresponding grade of the mineralization at the time). Yet additional channel samples collected from other trenches in different properties mentioned that same year also yielded consistently positive assay results.

In 2011, through a detailed and comprehensive study of various geophysical, geochemical, and geological data, I presided over the design, leadership, and organization of a large-scale gold exploration project worth more than CAD 20 million. Eight drill rigs from four independent drilling companies completed a total of 267 drill holes. As a result, the identified gold resources of an abandoned gold mine in western Canada that was closed in 1934 increased from less than 500,000 ounces to over 5 million ounces. The high-level indicated resources increased by 14 times, rejuvenating the old mine that had been dormant for nearly 80 years.

The following information from relevant government departments, cited from https://minfile.gov.bc.ca/Summary.aspx?minfilno=093H%20%20019 retrieved September 6, 2025, can prove this point:

"In June 2013, Barkerville Gold Mines (BGM) reported updated resource estimates for the Cow Mountain area of the Cariboo Gold project. Indicated resources are 16,100,000 tonnes grading 2.00 grams per tonne gold and Inferred resources are 44,600,000 tonnes grading 2.74 grams per tonne gold, using a cut off of 0.411 grams per tonne gold (*Press Release - Barkerville Gold Mines Ltd., June 18, 2013*). In March 2015, mineral resources for the Cow Mountain deposit were reported at 35.8 million tonnes indicated grading 2.4 grams per tonne gold and 27.5 million tonnes inferred grading 2.3 grams per tonne gold, using a 0.5 gram per tonne cut-off grade (*Dzick, W. (2015-03-31): Cow Mountain NI43-101 Technical Report*)".

These discoveries made by my team and I were subsequently further explored by Osisko Development Corp., the acquirer of BGM and the new owner of the properties. These discoveries were designated the Mosquito Zone, Shaft Zone, Valley Zone, Cow Zone, Lowhee Zone, Pit Vein Zone, Bonanza Ledge, BC Vein, and KL Zone, collectively known as the Cariboo Gold Project (CGP).

The latest NI 43-101 Technical Report on CGP, "Feasibility Study for the Cariboo Gold Project, District of Wells, British Columbia, Canada (Effective Date: April 25, 2025; Signature Date: June 11, 2025)", concluded that the key project outcomes are as follows:

- "Robust returns with base case after-tax net present value ("NPV") at 5% rate of $943 million ("M"), unlevered after-tax internal rate of return ("IRR") of 22.1% and payback of 2.8 years at $2,400 per ounce ("$/oz") gold price assumption. Using spot gold price of $3,300/oz, NPV5% improves to $2,066M, IRR 38.0%, and payback of 1.6 years;
- Cariboo Gold Mineral Resources: 17.38 million tonnes ("Mt") at 2.88 grams per tonne ("g/t") gold ("Au") (Measured and Indicated) and 18.77 Mt at 3.09 g/t Au (Inferred), exclusive of Mineral Reserves;
- Total Proven and Probable Mineral Reserve: 17.81 Mt at 3.62 g/t Au average diluted gold grade;
- Process recovery of 92.6%;
- Average annual production of ~190,000 ounces ("oz") of gold over a 10-year mine life (202,000 oz in the first 5 years), totalling 1.918 million ounces ("Moz") of gold over life of mine ("LOM");
- First gold anticipated in the second half of Year -1, following 24 months of construction and months of pre-production;
- Average total cash cost ("TCC") of USD 947/oz and All-in Sustaining Costs ("AISC") of USD 1,157/oz over the LOM, placing the Project within the lower half of the global cost curve for gold mines;
- Average base case LOM annual Free Cash Flow ("FCF") of $158M ($296M per year in the first 5 years);
- Improved single-phase build over 24 months and direct ramp-up to 4,900 tonnes per day ("tpd") with total initial capital cost of $881M and sustaining capital of $525M over the LOM.
- LOM taxes and duties of $640.1M and royalties of $292M;
- Strong support for local employment with up to 613 direct jobs created during peak construction and 525 permanent jobs during operations;
- Significant opportunities to potentially enhance Project economics and extend mine life through conversion of Mineral Resources adjacent to Mineral Reserves through infill drilling."

10. In mining practice, I was entrusted with the task of overseeing the mining of a new open-pit gold mine in western Canada from 2014 to 2015, and quickly raised the ore grade from less than 4 grams per ton gold to more than 12 grams per ton gold by improving mining methods and controlling ore dilution rate, helping the company turn losses into profits.

11. I have thoroughly researched and summarized the deep mathematical, physical, and chemical mechanisms of geological structure controlling mineralization. As soon as the preprint of the relevant article was released, it generated widespread interest resulted in large download numbers. The article is as follows:

- **JZ Yin**, Kuinuan Li, Hongyun Shi, Haoyu Yin and Yuhong Chao. 2025d. Mathematical, physical, and chemical interpretations of structural control and contributions to gold mineralization. Published: 16 January 2025 in Preprints.org. Preprints ID: 202501.1183. DOI: https://doi.org/10.20944/preprints202501.1183.v1.

12. In addition to my main professional job of academic research in earth sciences and exploration and development of solid minerals, I am also fascinated by the protection of the Earth's ecological environment, prevention and control of geological disasters, scientific and rational development and utilization of various natural resources including fresh water, spatial relocation and scientific and effective reclamation of abandoned mines, investigation, exploration, and knowledge dissemination and exchange of the history of geological sciences, and effective management of natural ecological parks. To this end, I wrote and published a considerable number of relevant popular science articles and books to increase public awareness of the importance of resource and environmental protection to positive acclaim. I have also actively participated in interviews from relevant newspapers and television stations, and embrace the use of modern media with large audiences to convey my relevant scientific concepts and ideas to the wider public.

For example, I have been interviewed by the national Chinese newspaper *Science and Technology Daily* (Figure 8), China Central Television, and a number of provincial television stations, conveying my scientific ideas on the rational development and protection of natural resources, the effective prevention and control of geological disasters, and the need to find an optimal balance between economic development and mining development. I continue to remind people that natural resources are extremely limited and non-renewable, and that contemporary people should not forget to leave necessary natural resources for future generations.

未雨绸缪话减灾

——访青年地质学家银剑钊博士

郭威

● 灾害与防治

Figure 8. After I accepted an exclusive interview with China national *Science and Technology Daily*, the reporter conveyed my scientific ideas in the newspaper, calling for the protection of the Earth's environment, scientific prevention and control of geological disasters, and the rational development and utilization of various mineral resources

I also introduced Canada's advanced national park management system to China hoping that the Chinese government could learn from it and protect the country's national parks, especially those on the Qinghai-Tibet Plateau, for the benefit of mankind. China's national newspaper in charge of the natural resources published the article in a full page spread (Figure 9).

6 国际博览 2018年9月22日 星期六 中国自然资源报

他山之石

以自然之法守护自然之美

——加拿大国家公园管理体制概述

国家公园设立原则：

面积大小不重要，更多是从科学视角考量

国家公园管理模式：

采取企业管理模式，严禁任何人为扰动

国家公园局职责定位：

生态资源的监护人，会讲故事的守护者

Figure 9. My article introducing Canada's park management system and experience took up an entire page of *the Chinese Newspaper of Natural Resources*

A representative series of works on this point is as follows:

- **JZ Yin**. July 14, 2021. Beautifying Our Mother Earth - Analysis of Spatial Relocation and Ecological Restoration Practices of Abandoned Mines in Europe. Theory Page on Page 3, *the Chinese Newspaper of Natural Resources* (in Chinese).
- **JZ Yin**. May 10, 2021. Look! How the UK deals with abandoned mine space. On Page 4, *the China Mining News* (in Chinese).
- **JZ Yin**. April 9, 2021. How to turn the abandoned mines into treasure - Inspiration from the Spanish abandoned mine geo-parks. International Expo Page on Page 6, *the Chinese Newspaper of Natural Resources* (in Chinese).

- **JZ Yin**. September 22, 2018. Protecting the Beauty of Nature with the Law of Nature - A Review of the Management System of Canadian National Parks. International Expo Page on Page 6, *the Chinese Newspaper of Natural Resources* (in Chinese, Figure 9).
- **JZ Yin**. 1997 (first printing) and 1999 (reprint). *Save the Earth*. Wuhan: China University of Geosciences Press, ISBN 7-5625-1229-9 / N●15 (first printing, 383 pages, in Chinese, Figure 4), and ISBN 7-5626-1229-9 (reprint, 384 pages, in Chinese, Figure 5).
- **JZ Yin**. April 25, 1998. Be kind to the Yangtze River. On Page 4, *the Science and Technology Daily* (in Chinese, Figure 10).
- **JZ Yin**, JB Wang and SR Wu. 1996. Save the Yangtze River, *the Cenozoic Era*. (1): 134-179 (in Chinese).
- **JZ Yin**. March 30, 1996. The Xintan landslide memorial - Yangtze River geological disaster survey, *the China Mining News* (in Chinese).
- **JZ Yin**. November 12, 1995. Touching the Yangtze River - Survey of geological hazards along the Yangtze River. On Page 4, *the China Mining News* (in Chinese).

·4· 科技日报 1998年4月25日

长江已不再是崇山峻岭中的一条翠绿色飘带，而是江水混浊、污染严重的第二条“黄”河。这条养育过炎黄子孙的巨龙，随时面临着被两岸数量众多的地质灾害侵蚀的威胁。人们啊——

善待长江吧

□ 殷之剑 记刊

我第一次亲身经历活生生的地质灾害，以及由此所造成的悲惨场面，是在1995年的5月，当时我受命到长江三峡考察，那是我第一次把自己投入到三峡的山山水水中，按理说，作为人生的第一次，我应该完全沉醉在向往已久的三峡风光中而乐不可支。但我没有这样，确切地说，如此愉悦的心境仅仅持续了很短的时间就烟消云散了。

我是在荆州停留了几天以后才来到三峡的起点城市宜昌的，到宜昌市的当晚，有人就邀我参观了葛洲坝。刚刚沉浸在葛洲坝的建设壮观中，还没有来得及细品味，第二天一大早，我就被快艇送到西陵峡中一个叫链子崖的地方。

当时，我对链子崖还一无所知，后来才极为吃惊地知道它是长江流域乃至全国最大的潜在岩崩体，其危害性之大，令人咋舌！关于这一点，有一个事实可以证明，链子崖岩崩体的首期治理，动用的是总理基金，在目前这个世界上，能够惊动一国总理的事情并不多，而能够动用总理基金的，就更少了，不到万不得已的危急时刻，是不会如此的，链子崖危岩体的巨大危害，由此可窥一斑。

后来，我又前往链子崖上游的黄腊石滑坡体上去体验地质灾害的可怕——黄腊石滑坡体是目前亚洲最大潜在滑坡体，再后来我又在巴东县见到了黄土坡滑坡、二道沟滑坡、三道沟滑坡等所造成的严重后果。

于是，我不但无法被情于三峡的壮美，反而不得不为三峡乃至整个长江所面临的灾难而担忧。有一个三十年如一日在三峡一带调查治理地质灾害的专家告诉我说，整个三峡流域计有大大小小的地质灾害（滑坡、崩滑、起石流）4000多处！这个数字让我大吃一惊。而比地质灾害更可怕的，是人们对长江的粗暴开发和利用，这种粗暴使长江的生态环境遭到了严重破坏。于是，长江病了。

三峡也病了，而且看来病得还不轻，但绝大多数国人并不知道这一点，古往今来，人们到处都在传颂的是长江的港湾和壮美，而很少有人会想到长江也会生病。

但长江的确是病了，因为长江是有生命的，长江是华夏儿女的母亲，千百年来，她养育了神州大地数以亿计的炎黄子孙。

长江作为一条巨大的交通动脉，一条不可缺少的黄金水道，对中国的过去，现在及未来的经济发展都起着举足轻重的作用，她畅通与否，直接关系到云、黔、川、鄂、赣、重庆市等地的经济发展与社会安定，有关专家估计，长江断航一天的直接经济损失就达1000万元人民币之巨！

然而，长江已不再是崇山峻岭中的一条翠绿色飘带，而是江水混浊、污染严重的第二条“黄”河，更为严重的是，由于人类的工程经济活动已成为改变和破坏自然环境的巨大力量，长江这条巨龙面临着随时被魔剑斩断的威胁，这些魔剑就是长江两岸数量众多的地质灾害。

由于人口的极度膨胀，人类不适当的耕作和对森林资源的肆意砍伐，长江流域的生态环境遭到了严重破坏。调查表明，长江流域的水土流失面积达56万平方公里，年水土侵蚀量达24亿吨，历史上号称“天府之国”的四川盆地已名不副实，裸露土丧失殆尽，基岩裸露，不增群种。

同样是因为水土流失，长江上游金沙江流域的山石一片光光，几乎成了不毛之地，金沙江水混浊不堪，每年向长江输入泥沙近3亿吨，生态环境恶化的结果是旱灾、洪灾、起石流三大灾害的频频发生……

这就是残酷和真实的长江！

人们啊，善待长江吧！

Figure 10. I published an article in the China National *Science and Technology Daily* calling for geological disaster prevention and water pollution control along the Yangtze River on April 25, 1998

PROFESSIONAL AFFILIATIONS, FELLOWSHIP AND MEMBERSHIP

- Member, International Commission on the History of Geological Sciences (INHIGEO), a commission of the International Union of Geological Sciences (IUGS), since 2000

- Member (P.Geo.), the Association of the Professional Engineers and Geoscientists of British Columbia, Canada, since 2006
- AJP, the Gemological Institute of America (GIA) since 2019
- Member, the Society for Geology Applied to Mineral Deposits (SGA), since 2024
- Fellow, the Royal Society for the Encouragement of Arts, Manufactures and Commerce since 2025

AWARDS AND HONORS

- **2025**

  I have been shortlisted for the 2025 *Society for Geology Applied to Mineral Deposits (SGA) SGA-Newmont Gold Medal* (the SGA Gold Medal) for my innovations in geosciences and the discovery of gold mineralized zones of significant economic value in western Canada. This award is intended to recognize outstanding geologists worldwide who have made important theoretical contributions to geosciences and significant practical mineral exploration and discovery achievements. As stated on the SGA website regarding this award, "**The SGA Gold Medal** recognizes the career achievements of the awardee involving unusually original work in the mineral deposit sector, which shall be broadly interpreted to encompass major contributions to (1) the science through research and (2) the development of mineral resources through mine geology, exploration and discovery. The award consists of a citation, a one ounce-weighing 999.99 fine gold medal, and reasonable travel and accommodation costs for attendance of the SGA Biennial Meeting (https://www.e-sga.org/membership/awards/sga-newmond-gold-medal, retrieved October 13, 2025）."

  "**The SGA Gold Medal** is based upon career accomplishments. It must be stressed that published scientific research is only one measure; other measures include leadership, both in research and industry; success in exploration or mining geology; and service to SGA and similar organisations. The award covers all aspects of research applied to mineral deposits, from field geology and mineral exploration, through development of analytical techniques, ore system models and metallogeny, and to the management of research and exploration projects and institutions. Eligibility is not restricted by the candidate's nationality, place of employment, or membership in the Society. Nomination forms can be downloaded below. Nominations must include the name and address of the candidate as well as a summary of the candidate's education, significant accomplishments and publications, and the name and address of the nominator. (https://www.e-sga.org/membership/awards/sga-newmond-gold-medal, retrieved October 13, 2025）"。

  Regarding those who made the shortlist including myself, the Chair of SGA Awards committee, Iain Pitcairn, commented in an email on August 5, 2025: "The awards were extremely competitive, more so this year than any other in the period of time I have been involved in the award committee. All of the nominees were very worthy and I really hope that you would consider resubmitting your nomination for the next

biennial SGA meeting which will be in Perth, Australia in 2027. We are aware how much work is involved in putting together the nomination and so we are happy to accept a revised and updated versions of your current nomination packages in 2027".

"The Society for Geology Applied to Mineral Deposits (SGA) is an international scientific society that promotes the science of mineral deposits geology. Its worldwide membership of over 1300 is composed of researchers, professionals and students from university, industry and government interested in economic geology, mineral resources, metallogeny, and environmental aspects related to mineral deposits. Its flagship publication, Mineralium Deposita, is recognized as a premier international scientific journal on the geology of mineral deposits. The SGA organizes biennial scientific meetings, international short courses and workshops and publishes the proceedings. The SGA also supports student chapters worldwide. (https://www.e-sga.org/about, retrieved October 13, 2025)".

- **2005**

In 2005, my popular science book *Save the Earth* (Figures 4 and 5) won "the 3rd Gemstone Literature Award" in the Science Popularization Category of the China Writers Association (Figure 11). Although this was an unexpected surprise, it reflected the shared voice from all walks of life in China and the general increase in awareness and concern about the environment, natural resources and geological disasters. This award was an embodiment of my original intent of putting information in the hands of the wider public to inform and educate.

荣誉证书

尊敬的 **银剑钊** 先生：

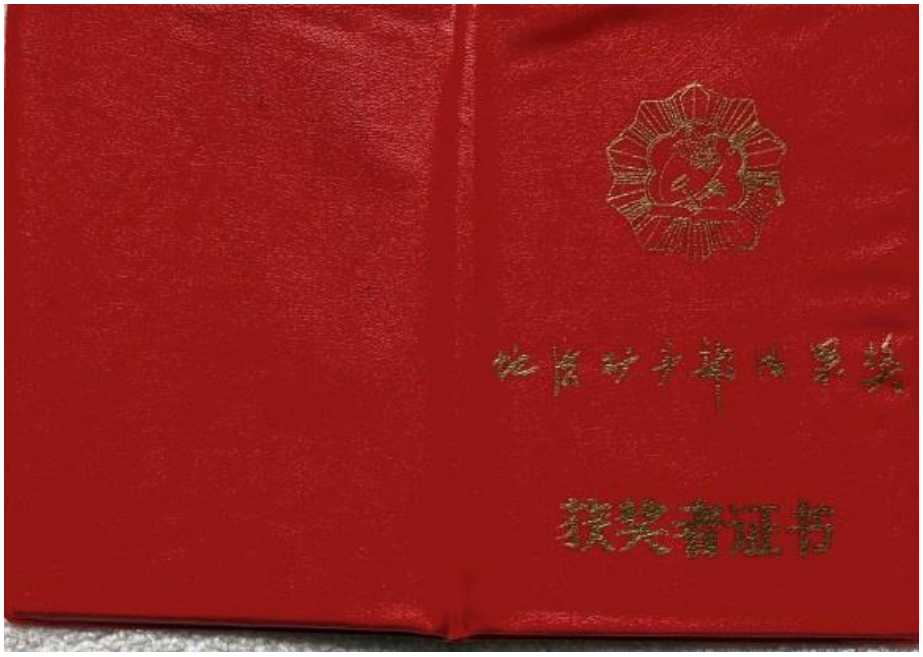
您的作品《拯救地球》荣获科普类第三届中华宝石文学奖，特颁此状，并致贺意。

中国作家协会 中国国土资源作家协会

二00五年五月

Figure 11. The "Gemstone Award" certificate for my popular science book *Save the Earth* awarded to me in May 2005

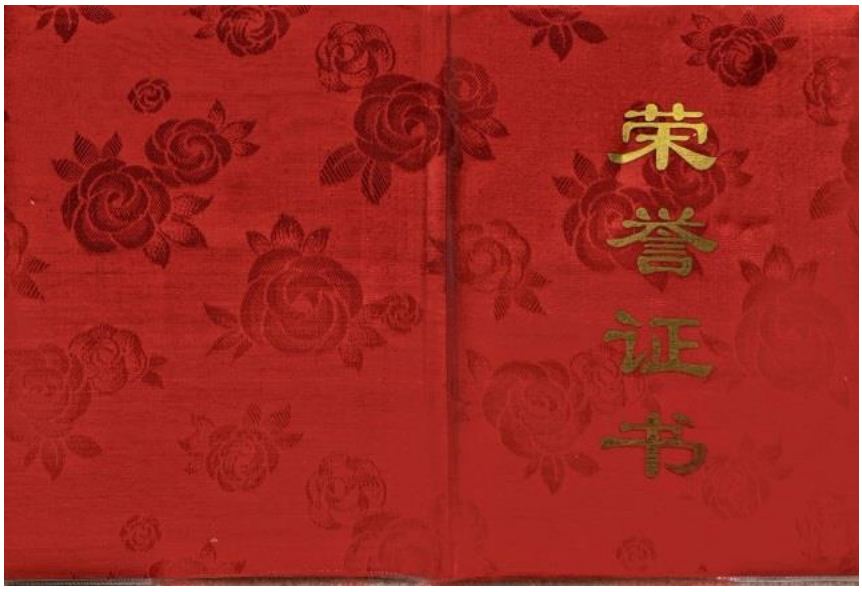
- **1998**
  My scientific research team's academic results on the world's only independent tellurium deposit won the second prize of scientific and technological achievements awarded by the Chinese Ministry of Natural Resources. Award certificate number: KJ-98-2-58, Award type: Science and Technology, Grade: Second Prize (in Chinese, Figure 12).

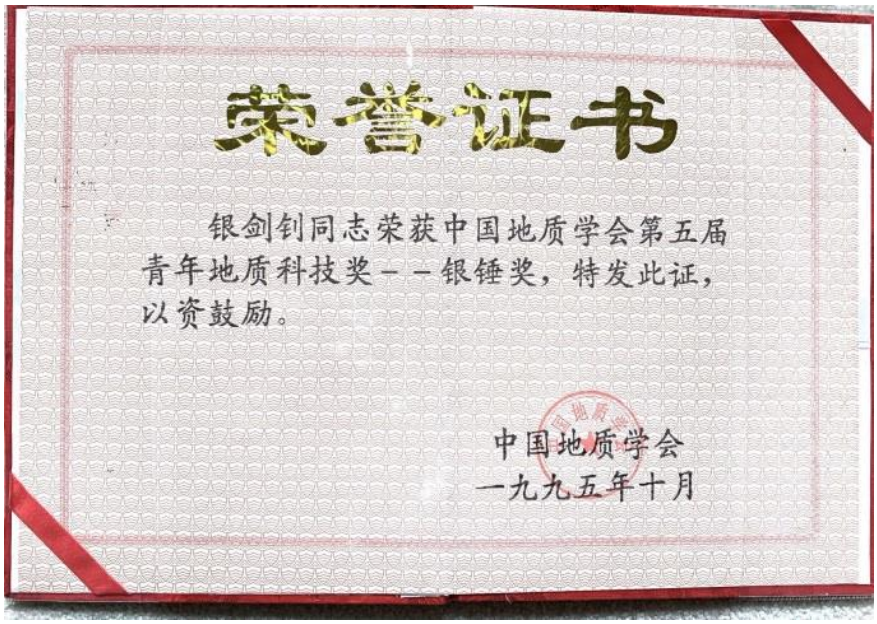


获奖者证书

Figure 12. My Second Prize Certificate of Scientific and Technological Achievements of the Chinese Ministry of Natural Resources

- **1995**
  I Won the Silver Geological Hammer Award of the 5th Youth Geological Science and Technology Award of the Geological Society of China (in Chinese, Figure 13).




荣誉证书

银剑钊同志荣获中国地质学会第五届青年地质科技奖——银锤奖，特发此证，以资鼓励。

中国地质学会
一九九五年十月

Figure 13. My certificate of the Silver Geological Hammer Award, the Geological Society of China in 1995

- **1991-1985**
  Between 1985 and 1991, I received several awards for outstanding undergraduate, outstanding master's, and outstanding doctoral candidates at two different universities. As the class leader of the 1990 doctoral candidates of one of the universities, I also received an award for outstanding class collective from one of the universities. Due to space limitations, not all items will be listed here. However, please feel free to contact me if you require more information on this topic.

IMPACT OF ACADEMIC WORKS AND PUBLICATIONS

- **Postdoctoral Academic Report**

  For a long period of history, mineral deposit geology faced three key challenges: the origin of ore-forming materials, metallogenic dynamics, and the mechanism of ore-forming material enrichment. After more than a hundred years of research, most researchers have reached a consensus on the first two challenges; that is, while relatively consistent conclusions have been reached, there are still some differences in the specific details. However, the third issue of the mechanism of ore-forming material enrichment is still under debate. In particular, the enrichment mechanism of rare elements and rare earth elements has always been controversial with no theoretical hypothesis that convinces most researchers in the industry. For this reason, traditional mineral deposit and geochemical theories have long sentenced rare elements such as tellurium, selenium, thallium, rhenium, indium, cadmium, gallium, germanium, etc. to a "death penalty". It has always been said in traditional textbooks that rare elements cannot form their own independent deposits, and can only appear as associated and/or symbiotic elements of traditional bulk mineral products such as copper, tin, lead, and zinc deposits, and can thus only be recovered and recycled as beneficial by-products that are almost negligible compared to the corresponding main minerals.

It has to be said that this "death sentence" is not completely groundless and arbitrarily set by human authority, but is rather fact based. For a long period of time before 1993, the wider geological community did not find any independent deposits of rare elements. In other words, the previous conclusion that rare elements cannot form independent deposits was largely based on mineral prospecting practice. Another scientific basis is the low crustal abundance of these rare elements, so low that they cannot be enriched into any independent mineral deposit based on traditional mineral deposit theory. Take the rare element tellurium as an example, its average crustal abundance in the Earth's crust is only 2.0×10^{-8} in China, and 1.34×10^{-9} worldwide (Tong Li, 1976). With such a low crustal abundance, it is obviously difficult and quite unimaginable to enrich into independent tellurium deposits.

In 1993, the world's only independent tellurium deposit was discovered and mined in the southeastern Qinghai-Tibet Plateau in China. I was fortunate to be involved in the comprehensive research and exploration of the deposit as a postdoctoral fellow. Undoubtedly, the primary problem I faced at the time was the key challenge mentioned above: how did the tellurium element, which has such a low abundance in the Earth's crust, enrich and form this independent deposit that amazed the world? By consulting the limited available information and referencing wider research results of interdisciplinary nano-materials, I later concluded that rare dispersed elements including tellurium compounds can reach the nanometer level under complex geological conditions such as appropriate temperature and pressure, and gradually enrich through special adsorption of the nano effect.

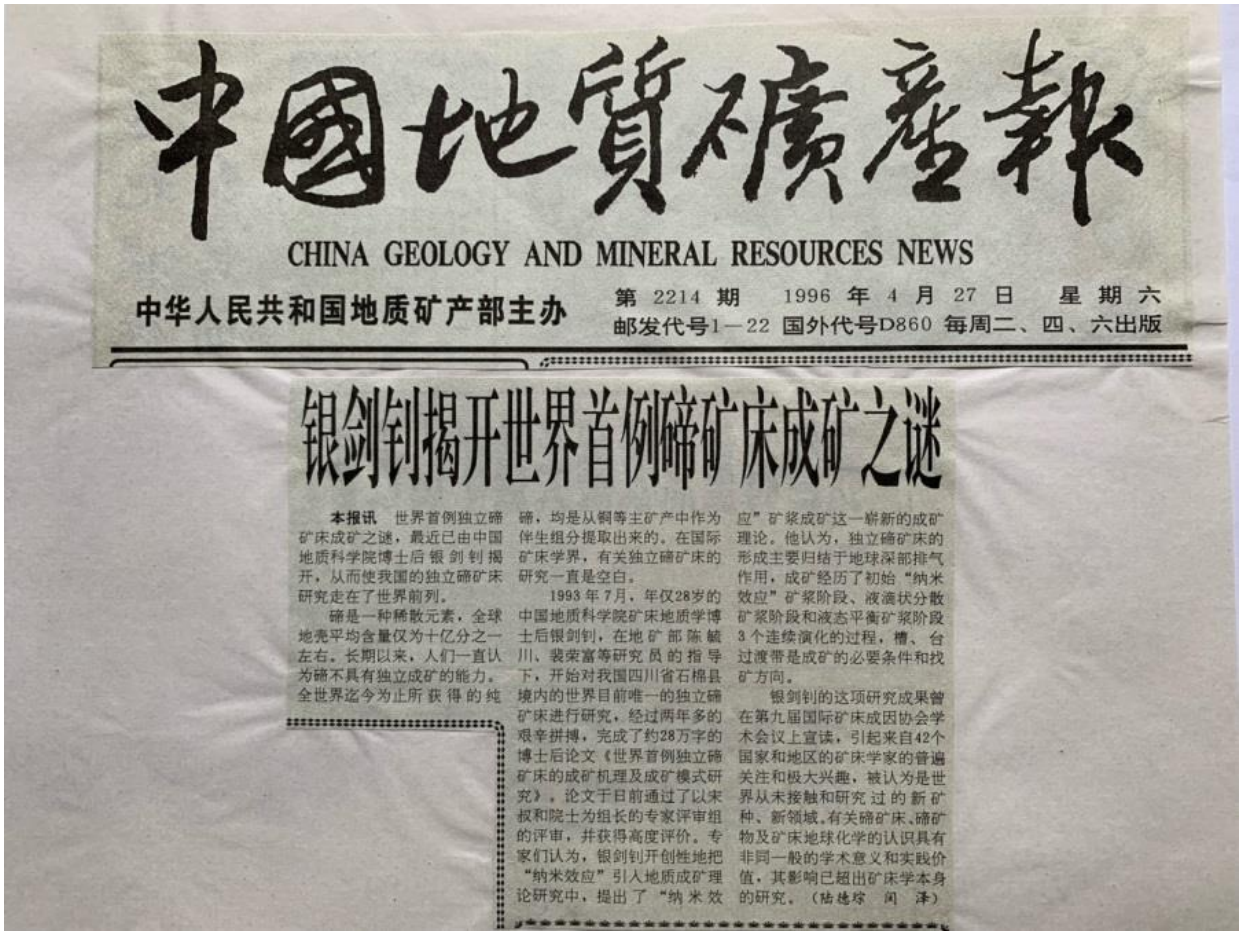
Specifically regarding the formation of the Dashuigou independent tellurium deposit, I came to the following conclusion: The deposit is formed by mantle degassing through a mantle plume and/or hot spot during the Himalaya orogeny. The degassed fluids are rich in nano-scale substances including Fe, Te, S, As, Bi, Au, Se, H_2, CO_2, N_2, H_2O, and CH_4, which are first enriched by nano-effect and then rise to a certain part of the Earth's crust along the lithospheric fault to form the deposit. The ultimate power for tellurium mineralization was from H_2 flow with high energy, which was produced through radiation from the melted iron of the Earth's outer core. The H_2 flow results in the Earth's degassing, as well as the mantle and crust's uplift.

This instance represents the first time that someone in the geological community has applied cutting-edge research results of modern high-tech nano-materials, namely the nano-effect of matter, to decipher the enrichment mechanism of rare elements.

In addition, in this research report I also apply bifurcation theory, a branch of dissipative structure theory, cynergetics, catastrophe theory, the localized dissipative structure and length of coherence, as well as the symmetry breaking instabilities, to explain the emplacement mechanism of the independent tellurium ore bodies.

As soon as my postdoctoral research report of more than 200 pages with nearly 320,000 Chinese characters passed the review by a team of experts including academicians from the Chinese Academy of Sciences, the wider news media immediately caught on to the report's implications and quickly began to report on its findings. The leading newspapers in China's geological and mining circles, *the Chinese Newspaper of Natural Resources* and *China Mining News*, successively reported it on their respective front pages with titles such as "Jian

Zhao Yin Unveils the Mystery of the World's First Independent Tellurium Deposit" or similar titles (Figures 14-15).



中国地质矿产报

CHINA GEOLOGY AND MINERAL RESOURCES NEWS

中华人民共和国地质矿产部主办 第 2214 期 1996 年 4 月 27 日 星 期 六
邮发代号1—22 国外代号D860 每周二、四、六出版

银剑钊揭开世界首例碲矿床成矿之谜

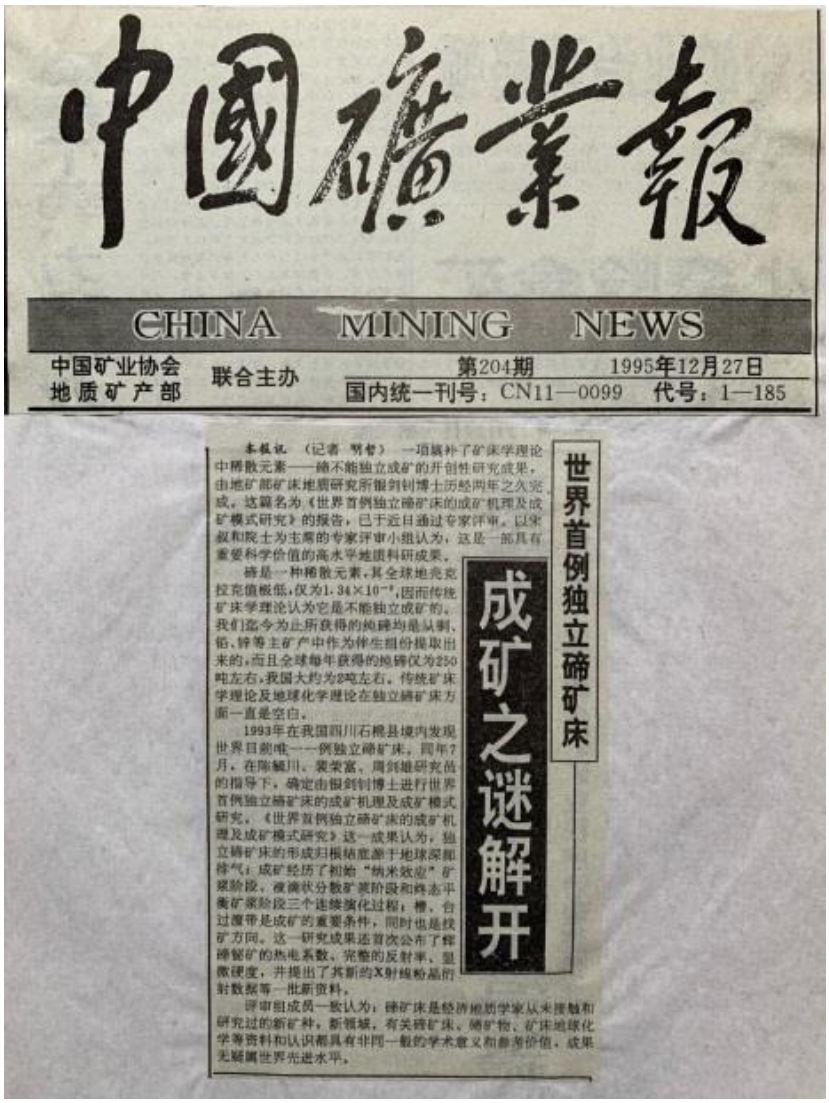
本报讯 世界首例独立碲矿床成矿之谜，最近已由中国地质科学院博士后银剑钊揭开，从而使我国的独立碲矿床研究走在了世界前列。

碲是一种稀散元素，全球地壳平均含量仅为十亿分之一左右。长期以来，人们一直认为碲不具有独立成矿的能力。全世界迄今为止所获得的纯碲，均是从铜等主矿产中作为伴生组分提取出来的。在国际矿床学界，有关独立碲矿床的研究一直是空白。

1993年7月，年仅28岁的中国地质科学院矿床地质学博士后银剑钊，在地矿部陈毓川、裴荣富等研究员的指导下，开始对我国四川省石棉县境内的世界目前唯一的独立碲矿床进行研究，经过两年多的艰辛拼搏，完成了约28万字的博士后论文《世界首例独立碲矿床的成矿机理及成矿模式研究》，论文于日前通过了以宋叔和院士为组长的专家评审组的评审，并获得高度评价。专家们认为，银剑钊开创性地把"纳米效应"引入地质成矿理论研究中，提出了"纳米效应"矿浆成矿这一崭新的成矿理论。他认为，独立碲矿床的形成主要归结于地球深部排气作用，成矿经历了初始"纳米效应"矿浆阶段、液滴状分散矿浆阶段和液态平衡矿浆阶段3个连续演化的过程，槽、台过渡带是成矿的必要条件和找矿方向。

银剑钊的这项研究成果曾在第九届国际矿床成因协会学术会议上宣读，引起来自42个国家和地区的矿床学家的普遍关注和极大兴趣，被认为是世界从未接触和研究过的新矿种、新领域。有关碲矿床、碲矿物及矿床地球化学的认识具有非同一般的学术意义和实践价值，其影响已超出矿床学本身的研究。（陆德琮 闻 泽）

Figure 14. *The China Geology and Mineral Resources News*, now *the Chinese Newspaper of Natural Resources*, reported my postdoctoral research results on the front page of the newspaper on April 27, 1996, with the title "Jian Zhao Yin Uncovers the Genetic Mystery of the World's First Independent Tellurium Deposit ". The last paragraph reads: "Jian Zhao Yin's research results were read out at the 9th International Association on the Genesis of Ore Deposits (IAGOD) Academic Conference, which attracted widespread attention and interest from ore geologists from 42 countries and regions. It is considered to be a new mineral species and new field that the world has never touched and studied. The understanding of tellurium deposits, tellurium minerals and their geochemistry has extraordinary academic significance and practical value, and its impact has exceeded the study of mineral deposits itself."



中国矿业报

CHINA MINING NEWS

中国矿业协会 地质矿产部 联合主办 第204期 1995年12月27日

国内统一刊号：CN11—0099 代号：1—185

世界首例独立碲矿床

成矿之谜解开

Figure 15. *The China Mining News* reported my postdoctoral research results in the title "The Formation Mystery of the World's First Independent Tellurium Deposit Solved" on the front page of the newspaper. The last paragraph reads: "The review team unanimously agreed that (independent) tellurium deposits are new mineral species and new fields that economic geologists have never touched and/or studied before. The information and knowledge about tellurium deposits, tellurium minerals, and their geochemistry are of extraordinary academic significance and reference value, and the academic results are undoubtedly at the world's advanced level."

The reports' findings naturally aroused great interest and attention from many senior geologists in the Chinese geological community. Among them, Academicians Shuhe Song[1] and Dongsheng Liu[2] of the Chinese Academy of Sciences, as the only two Chinese geological leaders in "the Chongqing Publishing House Scientific Academic Works Publishing Fund Steering Committee" (the other members are leaders or academicians in other disciplines in China, and the Chairman is Academician Weichang Qian[3], a great Chinese scientist), took the initiative to write letters to recommend my postdoctoral research report to the publishing house's fund committee for approval and publication. Another leader in the Chinese geological community, Academician Guangchi Tu[4], wrote the preface for this book on January 2, 1996 (Figure 2).

Mr. Tu wrote in his preface:

"In nature, the mineralization of general elements requires an enrichment order of magnitude of about 1-4 orders...Tellurium is enriched by 7 orders of magnitude at the Dashuigou deposit, which is extremely rare in nature...The difficulty of studying and finding independent deposits of dispersed elements is undoubtedly greater than that of non-dispersed elements. Some difficulties must be discovered and overcome in the research. Comprehensive research of multiple disciplines and multiple theoretical methods is necessary. At the same time, it is also necessary to recognize that each dispersed element has its own inherent uniqueness, and its mineralization mechanism is different from other dispersed elements. I believe that the publication of this monograph will benefit the research and search for dispersed elements, especially independent tellurium deposits."

Notes:

[1]**Shuhe Song**, also known as S.H. Sung (1915-2008), mineral deposit geologist, academician of the Chinese Academy of Sciences, former honorary director and researcher of the Institute of Mineral Resources, Chinese Academy of Geological Sciences. He edited the first masterpiece of mineral deposits in China, *Mineral Deposits of China*, and the 1:5 million map of mineral resources in China and its instructions. He also published the English versions of *Mineral Deposits of China* and the 1:5 million map of mineral resources in China and its instructions. He won the second prize of the Science and Technology Progress Award of the State Science and Technology Commission of China, the first prize of the Science and Technology Excellent Book Award of the State Press and Publication Administration, the National Excellent Book Award and the Science and Technology Award of the Ministry of Geology and Mineral Resources (now the Ministry of Natural Resources). He founded *Mineral Deposits Geology* (a quarterly academic journal) and served as its Editor-in-Chief.

[2]**Dongsheng Liu**, also known as T.S. Liu and/or Liu Tungsheng (1917-2008), Professor of earth and environmental sciences, senior academician of the Chinese Academy of Sciences, academician of the Third World Academy of Sciences, academician of the Eurasian Academy of Sciences, winner of the 2003 China National Highest Science and Technology Award, and winner of the "Humboldt Medal" of the European Geosciences Union.

[3]**Qian Weichang**, also known as Chien Wei-zang (1912-2010), physicist and applied mathematician, academician of the Chinese Academy of Sciences, foreign academician of the Polish Academy of Sciences, and academician of Ryerson College in Toronto, Canada. He served as the Dean of Tsinghua University, President of Shanghai University of Technology and Shanghai University, and Director of the Shanghai Institute of Applied Mathematics and Mechanics. In 1942, he received his Ph.D. in Applied Mathematics from the University of Toronto, Canada.

[4]**Guangchi Tu** (1920-2007), mineral deposit scientist and geochemist, academician of the Chinese Academy of Sciences, the Third World Academy of Sciences, PhD from the University of Minnesota, USA. Former director of the Institute of Geochemistry, Chinese Academy of Sciences; director of the Department of Earth Sciences, Chinese Academy of Sciences. Honorary lifetime member of the Geological Society of America, Chairman of the first, second, and third councils of the Chinese Society of Mineralogy, Petrology and Geochemistry; Editor-in-Chief of *Acta Mineralogica Sinica* and *Geochemistry*; and member of the Academic Degrees Committee of the State Council of China.

- **The Popular Science Book about Natural Resources and Environment Titled *Save the Earth***

As the person in charge of the project, I conducted on-site investigations of geological disasters, water pollution and water crisis, mineral resource development, etc. in many places in mainland China during the implementation of the scientific research project "Earth

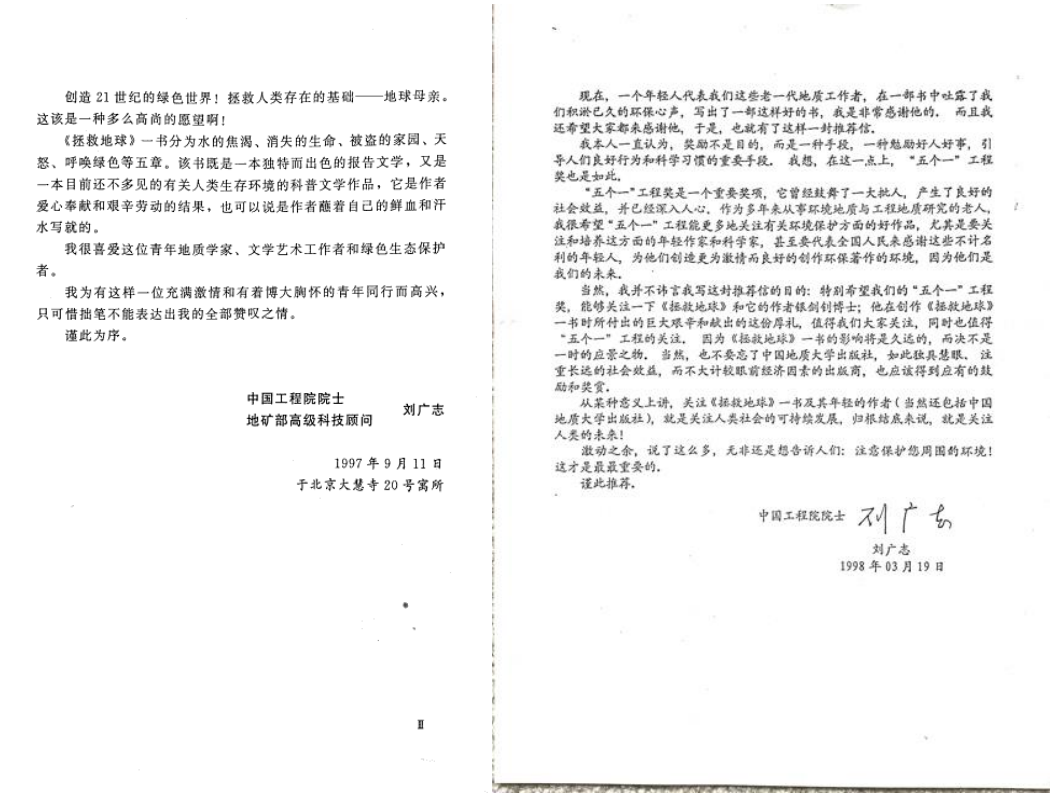
Science and Human Society" of the National Development and Reform Commission of China. Among them, the investigations specifically focused on water pollution along the Yangtze River Basin and associated geological disasters such as landslides and rock collapses on both sides of the river.

After completing this research project and the related monograph *Geosciences and Human Society* (Figure 1), I still felt that much was lacking in this area of the Chinese geological community. I was deeply troubled by the widespread impacts of large-scale geological disasters such as landslides, rock collapses, and mudslides that had already occurred or had future potential to take place, the serious pollution and damage to surrounding farmland caused by mining development across mainland China, the irrational use and waste of mineral resources, the serious bank collapse and erosion of other important rivers in China, the dry drought and severe shortage of freshwater resources in northwest China, and the serious casualties caused by the two major earthquakes in Chinese history. While research is important, I felt the limits of its impact to academia. I was concerned about the ability of the general public to access and understand the implications of this research on their own lives. How do we awaken the public's awareness of environmental protection, disaster prevention, and rational use of natural resources? This was, and continues to be, a major question on my mind. The popularization of science should not be viewed as less than academic research.

Therefore, I set about redeveloping the relevant materials in my spare time and compiling them into general science works that can be more readily received by the wider public. The result is the book *Save the Earth* (Figures 4 & 5), a popular science work based on field investigations on the rational development and utilization of natural resources, scientific protection of the Earth's ecological environment, and prevention and control of geological disasters. Naturally, *Save the Earth* is a by-product of the academic monograph *Geosciences and Human Society* (Figure 1). The two have the same origin, but the readers and the scope of audience reach are very different.

Professor Guangzhi Liu[5], an academician of the Chinese Academy of Engineering and noted geologist, wrote in his preface for this book on September 11, 1997 (Figure 16 left):

"At the International Continental Scientific Drilling Conference held in Potsdam, Germany in 1993, the former president of IUGC and the famous geologist W. Fyfe once said: 'Human beings only live on one planet, the Earth. The rapid growth of population, the deteriorating environment, the accelerated extinction of animals and plants, etc., all pose serious challenges to mankind. For the future of mankind, Earth scientists must study not only the Earth's yesterday, but also the Earth's tomorrow. The focus of future research should be on water resources, energy, mineral resources, nuclear waste treatment, earthquake and volcanic eruption prediction, etc.' ... This book is a rare popular science work on the human living environment. It is the result of the author's love, dedication and hard work. It can also be said that the author wrote it with his own blood and sweat. I like this young geologist and green ecological protector very much. I am happy to have such a passionate and broad-minded young colleague, but it is a pity that my clumsy pen cannot fully express all my admiration. "



创造21世纪的绿色世界！拯救人类存在的基础——地球母亲。这该是一种多么高尚的愿望啊！

《拯救地球》一书分为水的焦渴、消失的生命、被盗的家园、天怒、呼唤绿色等五章。该书既是一本独特而出色的报告文学，又是一本目前还不多见的有关人类生存环境的科普文学作品，它是作者爱心奉献和艰辛劳动的结果，也可以说是作者蘸着自己的鲜血和汗水写就的。

我很喜爱这位青年地质学家、文学艺术工作者和绿色生态保护者。

我为有这样一位充满激情和有着博大胸怀的青年同行而高兴，只可惜拙笔不能表达出我的全部赞叹之情。

谨此为序。

中国工程院院士
地矿部高级科技顾问　刘广志

1997年9月11日
于北京大慧寺20号寓所

II

现在，一个年轻人代表我们这些老一代地质工作者，在一部书中吐露了我们积淤已久的环保心声，写出了一部这样好的书，我是非常感谢他的。而且我还希望大家都来感谢他，于是，也就有了这样一封推荐信。

我本人一直认为，奖励不是目的，而是一种手段，一种鼓励好人好事，引导人们良好行为和科学习惯的重要手段。我想，在这一点上，"五个一"工程奖也是如此。

"五个一"工程奖是一个重要奖项，它曾经鼓舞了一大批人，产生了良好的社会效益，并已经深入人心。作为多年来从事环境地质与工程地质研究的老人，我很希望"五个一"工程能更多地关注有关环境保护方面的好作品，尤其是要关注和培养这方面的年轻作家和科学家，甚至要代表全国人民来感谢这些不计名利的年轻人，为他们创造更为激情而良好的创作环保著作的环境，因为他们是我们的未来。

当然，我并不讳言我写这封推荐信的目的：特别希望我们的"五个一"工程奖，能够关注一下《拯救地球》和它的作者银创钊博士；他在创作《拯救地球》一书时所付出的巨大艰辛和献出的这份厚礼，值得我们大家关注，同时也值得"五个一"工程的关注，因为《拯救地球》一书的影响将是久远的，而决不是一时的应景之物。当然，也不要忘了中国地质大学出版社，如此独具慧眼、注重长远的社会效益，而不大计较眼前经济因素的出版商，也应该得到应有的鼓励和奖赏。

从某种意义上讲，关注《拯救地球》一书及其年轻的作者（当然还包括中国地质大学出版社），就是关注人类社会的可持续发展，归根结底来说，就是关注人类的未来！

激动之余，说了这么多，无非还是想告诉人们：注意保护您周围的环境！这才是最最重要的。

谨此推荐。

中国工程院院士 刘广志

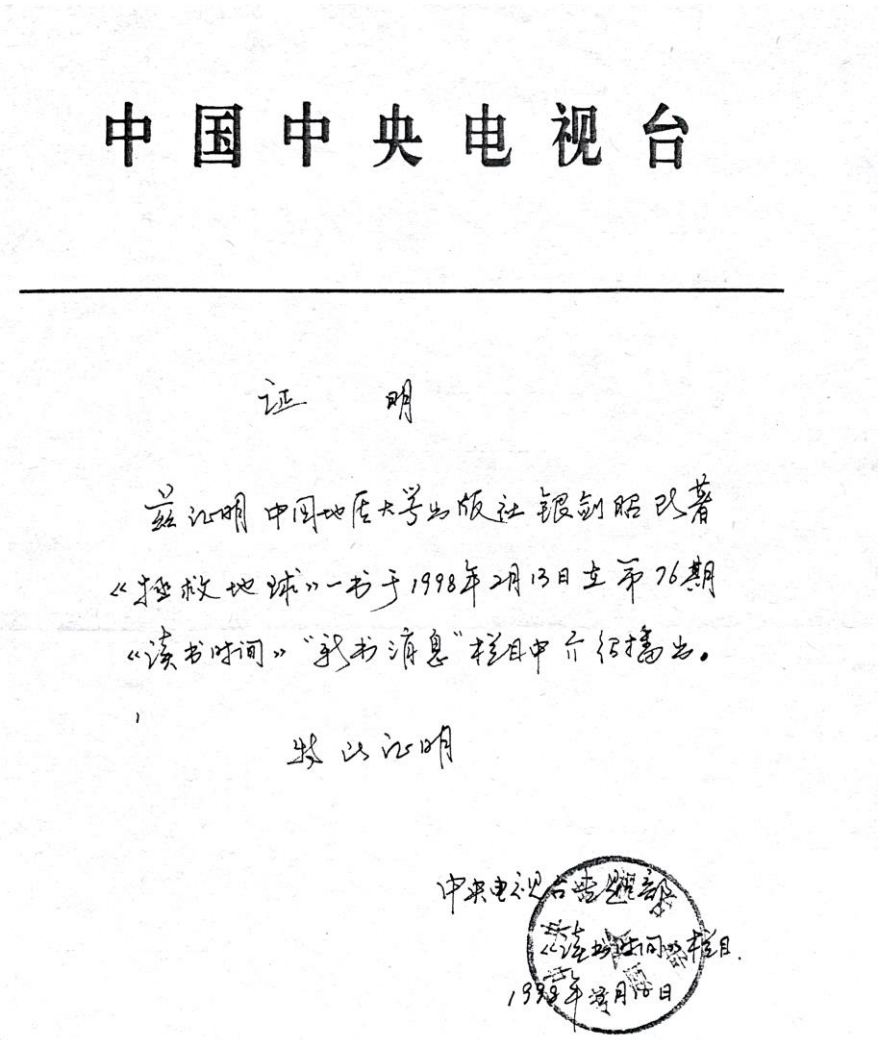
刘广志
1998年03月19日

Figure 16. Part of the preface by Academician Liu (left) and his later recommendations on the book (right)

Notes:

[5]**Guangzhi Liu** (1923-2014), a drilling engineering expert, academician of the Chinese Academy of Engineering. He was the chief engineer of the Exploration Department of the Ministry of Natural Resources and the Exploration Engineering Equipment Industry Company, the Chinese Coordinator of the CC-4 group of the International Continental Lithosphere Program, the Chairman of the Exploration Engineering Professional Committee of the Chinese Geological Society, and the Consultant of the Consulting Research Center of the Ministry of Natural Resources. He was awarded the first prize of the National Science and Technology Progress Award of China and the World Chinese Major Science and Technology Achievement Award.

After the book was first published in September 1997 (Figure 4), it quickly attracted vigorous publicity and coverage from almost all major media in mainland China. Reporters across newspapers, magazines, and TV stations interviewed the author, me. From 1997 to 1998, many domestic news media, including different channels of *CCTV* (Figure 17), *China National Radio's "News and Newspaper Digest Program"* (Figure 18), *China Education Television*, *People's Daily*, *Guangming Daily*, *China Reading Newspaper*, *Science and Technology Daily*, *China Book Review*, *Yangtze River Daily*, *Chinese Book Review Monthly*, *Publishing Science*, *Chinese Newspaper of Natural Resources*, and *China Mining News* (Figure 19), carried out full-scale publicity and coverage of the work.



中国中央电视台

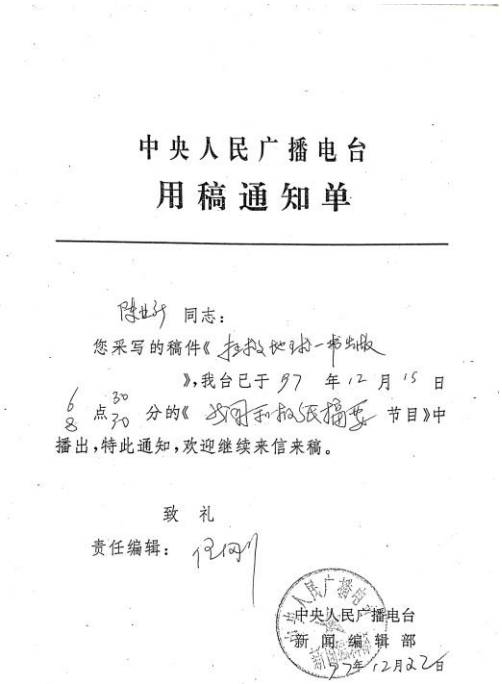
证 明

兹证明 中国地质大学出版社 银剑昭 此著
《拯救地球》一书于1998年2月13日立第76期
《读书时间》"我书消息"栏目中介绍播出。

特此证明

中央电视台[illegible]
1998年2月16日

Figure 17. Notice on *CCTV* broadcasting the book *Save the Earth* on its different channels



中央人民广播电台

用稿通知单

陈世珍 同志：

您采写的稿件《拯救地球一书出版》，我台已于97年12月15日6点30分的《文明和报纸摘要》节目中播出，特此通知，欢迎继续来信来稿。

致 礼

责任编辑：

中央人民广播电台
新闻编辑部
97年12月22日

Figure 18. Notice from *China National Radio* on broadcasting the book *Save the Earth*

托起一个观念

——读报告文学《拯救地球》

□陆德琼

读了报刻村博士的长篇报告文学《拯救地球》，我脑子里闪现的就是这样一个怪怪的题目，一如作者在书尾处尚未尽意的情绪在我心底涌动，极欲成吟或唱千百万孩子痴迷不已的动画片《狮子王》中的主题歌：太阳万岁，月光万岁，雨万岁，雪万岁，生命万岁……

我们所赖以生存的地球，自35亿年前出现生命以来，虽说物种的诞生与灭绝成了生物进化过程的一种定律，但两者的速率绝对应该是大致平衡的。可由于人类繁衍的毫无节制，欲望本能膨胀的基希天物，生态环境的污染与破坏，平衡自然消失，时至今日，我们所拥有的这颗原本美丽蓝和动人的蓝色星球，呈现出的画面却十分触目惊恐，令人悲怆。每天，这个世界有55000公顷森林从地球上消失，63平方英里的土地成为不毛之地，丧失农田表土达6000多万吨；每天，至少有1.5万人因饮用污染水而死亡，其中大部分为儿童；存增臭氧的含氟氯烃类物质和二氧化碳，日排入大气量分别达到1500多吨和5600万吨，15亿人呼吸着这样的空气，导致每天至少800人过早死亡；在日均倾入海洋的1.2万桶石油，3800万磅垃圾的同时，珠穆朗玛峰的雪样中已含汞含铅，南极企鹅的体内含有了致癌物——滚，风已不清，月已不朗，雨酸了，雪污了，臭氧层又被破坏。

《拯球地球》的可读耐读之处，就是作者不仅向世人展示了一幅人类家园在毁坏的扼腕叹息画面，也为令人后人重整家园提供了一个很好的处方。这就是作者在书中提出的"度"的概念。这个"度"，就是人类生存与发展的平衡点。按照这样的"最佳平衡点"设计要求去实施资源的开发利用和环境生态的保护，便可实现人类社会的可持续发展宏伟目标。说到底，我们还是回到了作者在这部书里展应始终的绿色生命的观念。作为一名资年地质学家，在拓殖的国土，石，山，川，江，河，湖，海的接触中，对大自然的绿色有一种倾心的偏爱与眼位，基于这样的情感与责任，作者在考察了人类家园横遭破坏的触目史实后，向我们叙述了一种区分文明与野蛮的绿色标志，这个绿色标志，直指指向遵循自然和其他物种的生存权利，保护地球免遭破坏的新文化与新文明。显然，"这决不可能是哪个人的个人行为"，作为一种觉悟，一种观念，通常需要借助某种权力的强制推行，而作为倾剑到和同他一样的有识知识分子，所能做的，似乎就是凭借自己的声音和文字，竭尽所能地把它高高地托出一个水平线，以便引起更多人群的关分注视。

新书看台 中国地质大学出版社

《拯球地球》从水谈起，谈海，谈生物，谈森林与气候，谈土地岩石和地质灾害，同构了一切生命形式与大气圈、水圈、岩石圈磨合系统的完整的生态画面，是一部集科普、文学，又不失生态哲学和环境伦理学意味的多重意义的长篇"报告"。在全书的技术操作上，作者成许卷带鉴了艾芬哈德写传记的多段式手法，把五章截成为116节，使一部沉甸厚实的专著，活泼成一个个段落紧凑的小短件，并不时穿插出令人心酸又不得不笑的小故事，憧憬扑克游戏即或读过科塔罗尔《鼠疫子》小说名著的读者，一定会得从中得到的启示应用到《拯救地球》的阅读里来。哪怕您一时只有几分钟的时间，您只需随意读一篇，便能看完完整的一节，从而获得某点启迪或某个知识。

我还想说一句的是，这部由中国地质大学出版社出版的34万字报告文学，竟曹不到一个错别字。至少是我没有发现，这在近年的出版物中，是极其罕见的。

Figure 19. One of the newspapers promoted the book *Save the Earth* with the title "Holding the concept--hope everyone would have a long-term thinking of sustainable development"

The intensive publicity and widespread availability of this book have inspired ordinary people all over China to pay attention to rational utilization of natural resources, the environment protection, and geological disasters prevention. Some schools even use this book as a reference textbook for students in and out of class. After seeing this book, some senior Chinese leaders took the initiative to arrange to meet with me and praise the book, subsequently expressing their full agreement with the relevant views in the book.

Many readers also wrote to me, demonstrating the wide reach of *Save the Earth*. One of the scientific workers engaged in earthquake prediction research wrote to me on July 31, 1998 (Figure 20):

"Recently, I have seen reports about your book *Save the Earth* and you in newspapers and magazines, which is very encouraging..... The main purpose of this letter is to 'ask' for the book *Save the Earth*. I hope that there will be such a good book on the bookshelf of our work unit and in everyone's hands... This year, our country has entered the disaster reduction plan, (because) earthquakes and other geological disasters are shocking everywhere. I plan to go deeper into the research of geological disasters. Of course, your book can help me the most."

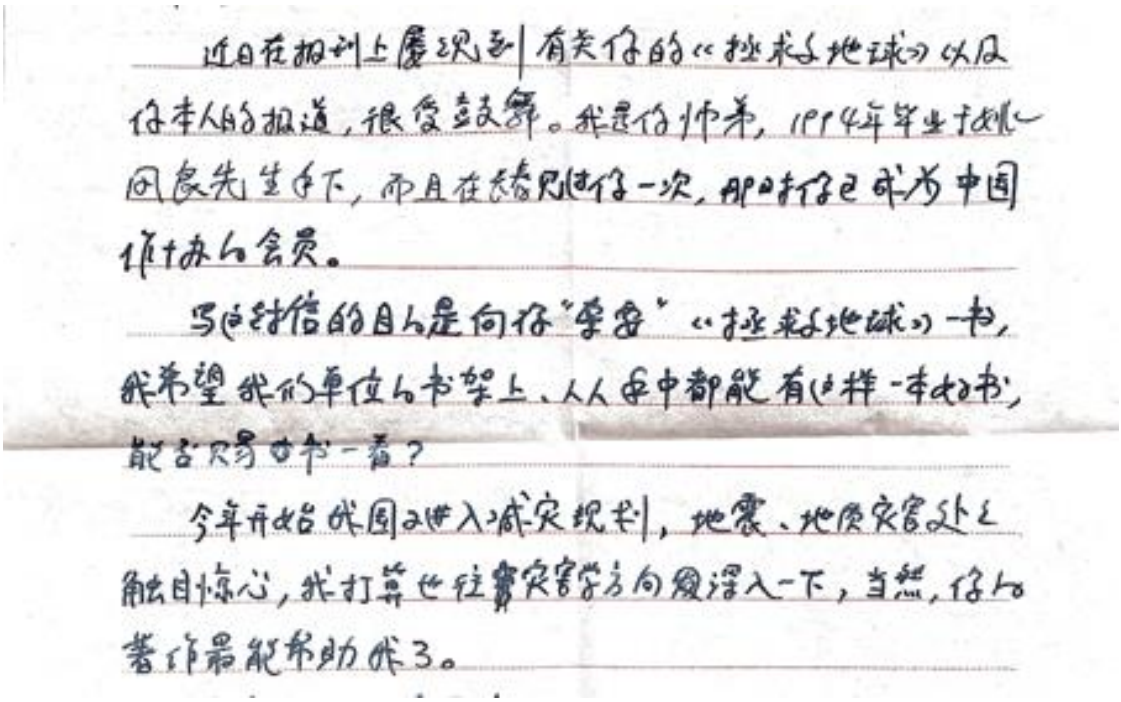


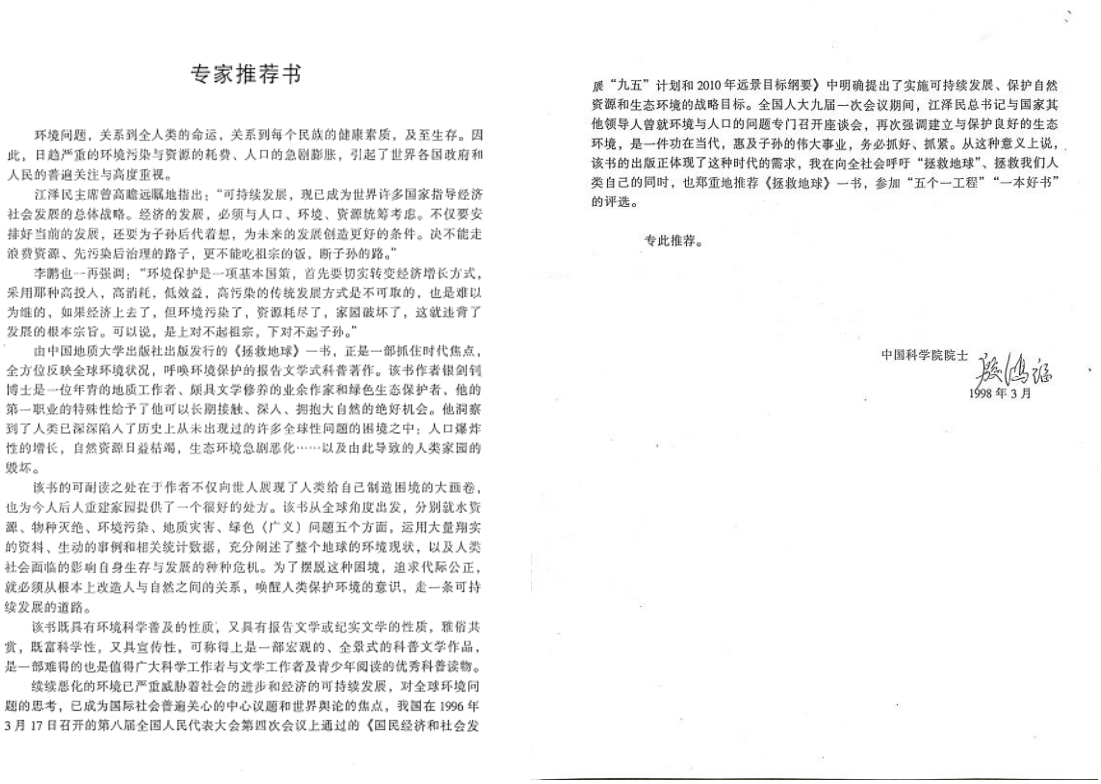
Figure 20. Partial image of the readers' letters to me

With growing attention from the wider Chinese society and the support of senior government leaders, a nearly 400-page second edition of the book *Save the Earth* was reprinted and published in 1999 (Figure 5). Six years later, in 2005, the book *Save the Earth* (Figures 4 and

5) won "the 3rd Gemstone Literature Award" in the Science Popularization Category of the China Writers Association as mentioned above (Figure 11).

In March 1998, Professor Hongfu Yin[6], noted geologist and academician of the Chinese Academy of Sciences, commented on this book (Figure 21):

"Environmental issues are related to the fate of all mankind, the health and even the survival of every nation. Therefore, the increasingly serious environmental pollution and natural resource consumption, and the rapid expansion of the population have attracted the general attention and great attention of governments and people around the world... The book is worth reading because the author not only shows the world the big scroll of the difficulties that humans have created for themselves, but also provides a good prescription for the present and future generations to rebuild a beautiful home. From a global perspective, the book uses a large amount of detailed information, vivid examples and relevant statistical data to fully explain the problems of the entire Earth in five aspects: freshwater resources, species extinction, environmental pollution, geological disasters, and broad green issues. The current state of the environment, as well as the various crises facing human society that affect its own survival and development. In order to get rid of this dilemma and pursue intergenerational justice, it is necessary to fundamentally transform the relationship between man and nature, awaken human awareness of protecting the environment, and take a path of sustainable development. This book is both scientific and propaganda, and is a macro and panoramic popular science work that is worth reading for the majority of scientific and technological workers and young people... In a sense, the publication of this book reflects the requirements of the times. While I call on the whole society to 'save the earth' and save ourselves, I also solemnly recommend the book *Save the Earth* to everyone."



专家推荐书

环境问题，关系到全人类的命运，关系到每个民族的健康素质，及至生存。因此，日趋严重的环境污染与资源的耗费、人口的急剧膨胀，引起了世界各国政府和人民的普遍关注与高度重视。

江泽民主席曾高瞻远瞩地指出："可持续发展，现已成为世界许多国家指导经济社会发展的总体战略。经济的发展，必须与人口、环境、资源统筹考虑。不仅要安排好当前的发展，还要为子孙后代着想，为未来的发展创造更好的条件。决不能走浪费资源、先污染后治理的路子，更不能吃祖宗的饭，断子孙的路。"

李鹏也一再强调："环境保护是一项基本国策，首先要切实转变经济增长方式，采用那种高投入，高消耗，低效益，高污染的传统发展方式是不可取的，也是难以为继的，如果经济上去了，但环境污染了，资源耗尽了，家园破坏了，这就违背了发展的根本宗旨。可以说，是上对不起祖宗，下对不起子孙。"

由中国地质大学出版社出版发行的《拯救地球》一书，正是一部抓住时代焦点，全方位反映全球环境状况，呼唤环境保护的报告文学式科普著作。该书作者银剑钊博士是一位年青的地质工作者、颇具文学修养的业余作家和绿色生态保护者，他的第一职业的特殊性给予了他可以长期接触、深入、拥抱大自然的绝好机会。他洞察到了人类已深深陷入了历史上从未出现过的许多全球性问题的困境之中：人口爆炸性的增长，自然资源日益枯竭，生态环境急剧恶化……以及由此导致的人类家园的毁坏。

该书的可耐读之处在于作者不仅向世人展现了人类给自己制造困境的大画卷，也为今人后人重建家园提供了一个很好的处方。该书从全球角度出发，分别就水资源、物种灭绝、环境污染、地质灾害、绿色（广义）问题五个方面，运用大量翔实的资料、生动的事例和相关统计数据，充分阐述了整个地球的环境现状，以及人类社会面临的影响自身生存与发展的种种危机。为了摆脱这种困境，追求代际公正，就必须从根本上改造人与自然之间的关系，唤醒人类保护环境的意识，走一条可持续发展的道路。

该书既具有环境科学普及的性质，又具有报告文学或纪实文学的性质，雅俗共赏，既富科学性，又具宣传性，可称得上是一部宏观的、全景式的科普文学作品，是一部难得的也是值得广大科学工作者与文学工作者及青少年阅读的优秀科普读物。

续续恶化的环境已严重威胁着社会的进步和经济的可持续发展，对全球环境问题的思考，已成为国际社会普遍关心的中心议题和世界舆论的焦点，我国在 1996 年 3 月 17 日召开的第八届全国人民代表大会第四次会议上通过的《国民经济和社会发展"九五"计划和 2010 年远景目标纲要》中明确提出了实施可持续发展、保护自然资源和生态环境的战略目标。全国人大九届一次会议期间，江泽民总书记与国家其他领导人曾就环境与人口的问题专门召开座谈会，再次强调建立与保护良好的生态环境，是一件功在当代，惠及子孙的伟大事业，务必抓好、抓紧。从这种意义上说，该书的出版正体现了这种时代的需求，我在向全社会呼吁"拯救地球"、拯救我们人类自己的同时，也郑重地推荐《拯救地球》一书，参加"五个一工程""一本好书"的评选。

专此推荐。

中国科学院院士 [signature]

1998 年 3 月

Figure 21. Partial image of Academician HF Yin's comments and recommendations on the book *Save the Earth*

Notes:

[6]**Hongfu Yin** (1935-Present), geologist, stratigraphic paleontologist, academician of the Chinese Academy of Sciences, Professor and former President of China University of Geosciences (Wuhan). Served as vice Chairman of the Triassic Section of the International Stratigraphic Commission and Chairman of the International Permian-Triassic Boundary Working Committee. Won the Yin Zanxun Stratigraphic Paleontology Award of the Chinese Paleontological Society, the Li Siguang Geological Science Award, the Ho Leung Ho Lee Earth Science Award, the Second Prize of the National Natural Science Award of China, and the Lifetime Achievement Award of the Chinese Paleontological Society.