United Nations Educational,Scientific and Cultural Organization

UNESCO International Centre on Global-Scale Geochemistry

联合国教科文组织全球尺度地球化学国际中心进展报告（2020-2021）

UNESCO International Centre on Global-Scale Geochemistry

Progress 2020-2021

王学求

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提纲Outline

1. 简介

Brief Introduction

2. 使命与进展

Main Missions and Progress

3. 未来展望

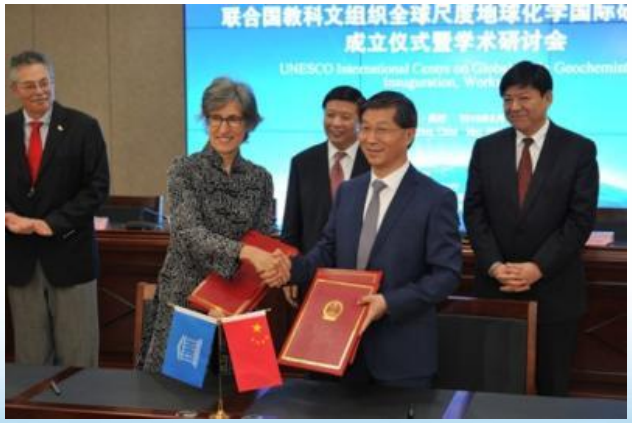
Future Outlook

简介 Introduction to the ICGG

中心经教科文组织和中国政府批准于2016年5月正式成立

The UNESCO International Centre on Global-Scale Geochemistry (ICGG) was established in May 2016, on the approval of the UNESCO and the State Council, after jointly signed by the Ministry of Ministry of Land and Resources (now the Ministry of Natural Resources), the Ministry of Science and Technology, the Ministry of Education, the Ministry of Foreign Affairs and the Ministry of Finance.

- November 2013, the 37th UNESCO General Conference approved the establishment of the Center.
- September 2015, the State Council officially approved the establishment of the Centre.
- May 12th, 2016, inauguration of ICGG and initiation of the international scientific cooperation Project “Chemical Earth”.



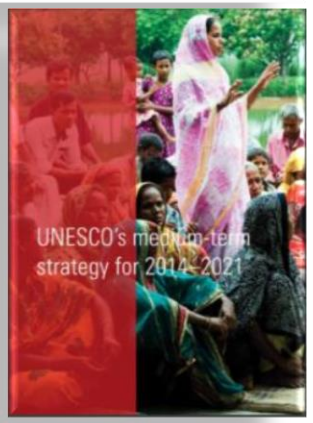
简介 Introduction to the ICGG

- 地球化学国际中心是为全球自然资源与环境可持续发展提供全球地球化学数据的权威研究机构。
- **The ICGG is an international cooperation research organization to provide authority global geochemical observation data for sustainable development of natural resources and environments.**

简介Introduction to the ICGG

中心使命依据下列战略设置
Accord with the following strategies

- United Nations 2030 Agenda for Sustainable Development
- UNESCO's Medium-term Development Strategy (2014-2021)
- China’s “the Belt and the Road" Initiative
- ICGG international scientific project “Chemical Earth"
- IUGS “Resourcing Future Generations"
- International Council for Science Project "Future Earth "



Introduction to ICGG

使命Missions

- To foster knowledge and technology of global-scale geochemistry, and to standardize global-scale geochemical methods,
- To establish monitoring networks to document the baselines and changes of chemical elements across the globe,
- To educate and train postgraduate students, scientists and engineers, and to provide technical assistance to developing countries.
- To promote equal access to basic services for obtaining global-scale geochemical data and knowledge-sharing and to build up a bridge between the scientific commu decision makers and the general public in the field of global-scale geochemistry.

Introduction to ICGG

第一个六年主要任务（2016-2021）
Tasks in the first Six Years (2016 to 2021)

- To set up international cooperation networks in the field of global-scale geochemistry, and to foster knowledge and technology for global sustainable development of natural resources and environments;

- To initiate ***Chemical Earth Program*** to cover 25% of the land surface area of the Earth by global geochemical baseline mapping, priority in the regions of the "Silk Road" countries, and to document concentrations and distributions of 76 elements;

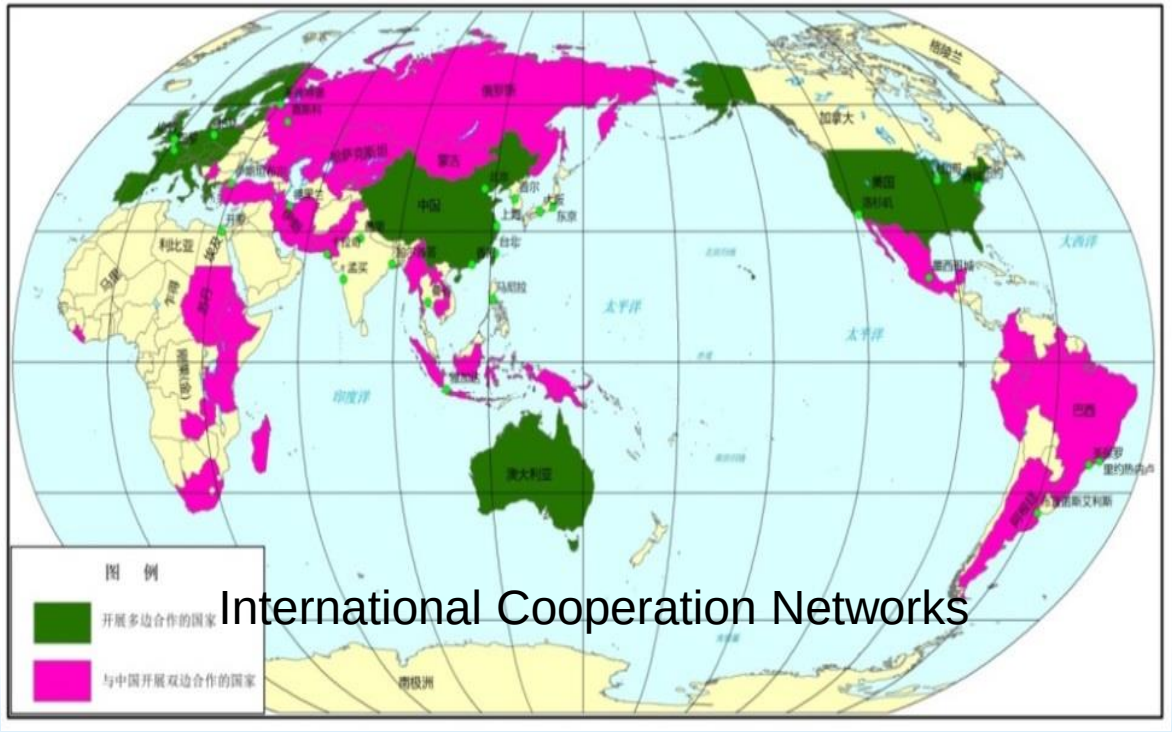
- To build the education and training base, to hold at least 5 training courses on global-scale geochemical knowledge and geochemical mapping methodologies, and to provide technical assistance to developing countries;

- To establish a digital Chemical Earth platform for geochemical big data management based on the Internet, to promote equal access to basic services for global-scale geochemical data and knowledge-sharing, and to build up a bridge between the scientific community, decision makers and the general public.

进展Progress

Initiative and Implementation of the international ‘Big Science’ project - *Chemical Earth*

- 1. 建立了由57个国家400余位科学家参加的国际合作网络
- Creation of international cooperation networks: 57 countries (28 bilateral agreements), 400 scientists.



International Cooperation Networks

进展Progress

2. 制订技术标准6份
Develop and standardize international guidelines for geochemical mapping which has played a leading role across the world

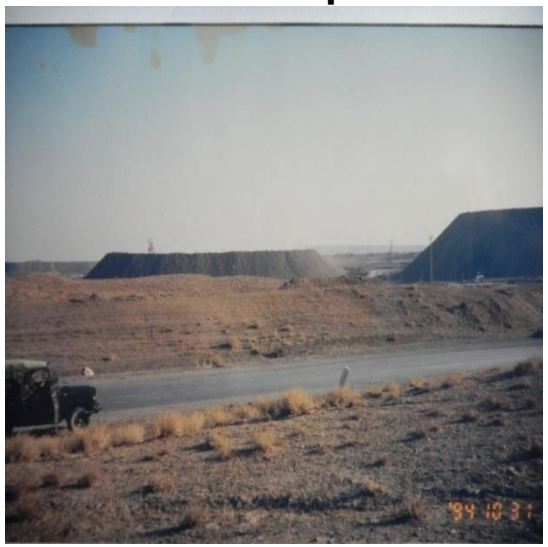
- Development of geochemical sampling methods for different landscapes and formulated seven International Geochemical Mapping Guidelines.
- The Global Geochemical Baselines Guidelines has been approved by ICGG Scientific Committee as the international standard.

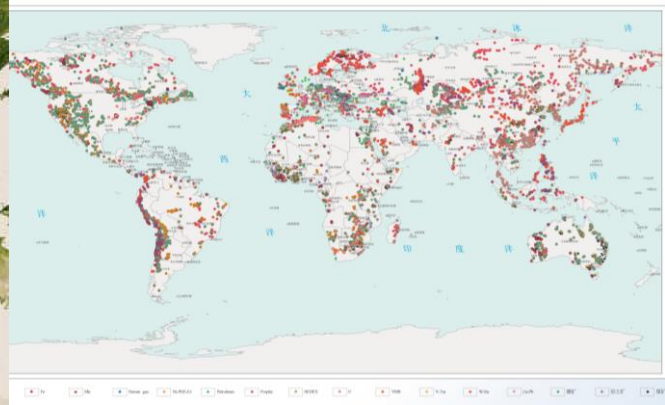
进展Progress

2. 制订技术标准，特别是干旱荒漠区技术标准在11个国家只用
Develop and standardize international guidelines for geochemical mapping

- **International Guideline for Geochemical Sampling in Desert Terrains has been adopted as an international standard and has been promoted and used in 11 countries.**

- 世界上70%以上超大型矿床产出于面积仅占世界陆地面积三分之一的荒漠戈壁区: 中亚、西亚、非洲、澳洲、南美
- 荒漠戈壁区地球化学填图难点：普遍准平原化，风成沙广泛发育，盆地沉积物覆盖。
- 干旱荒漠区地球化学采样标准，解决了过去一直没有技术方案和标准的问题，被11个国家采用。

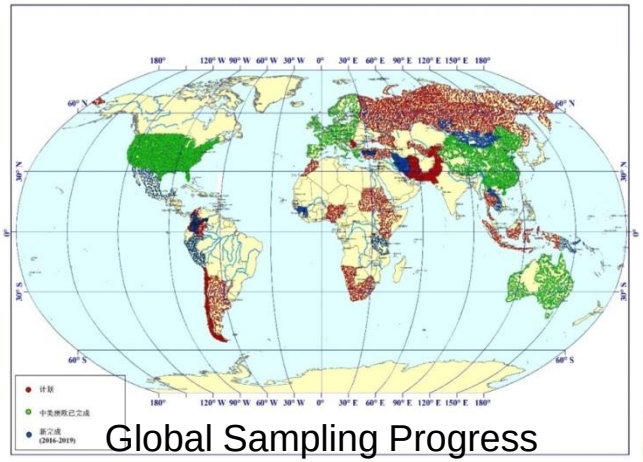




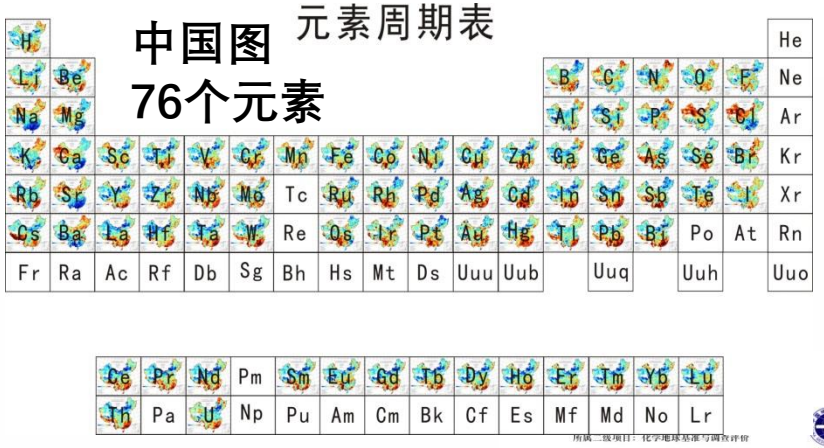
进展Progress

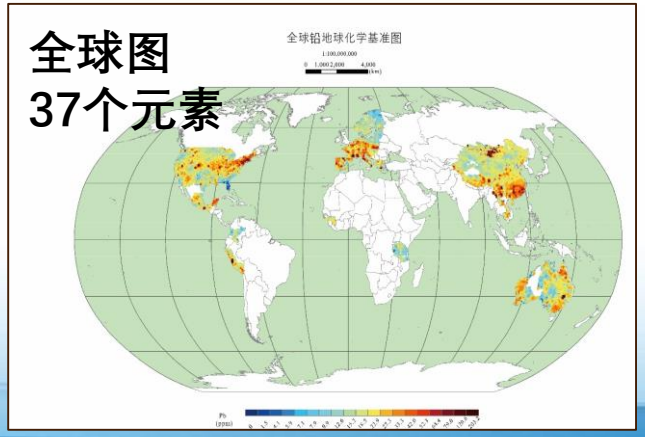
3. 全球地球化学基准网覆盖全球陆地31%，编制了“化学地球”系列图集

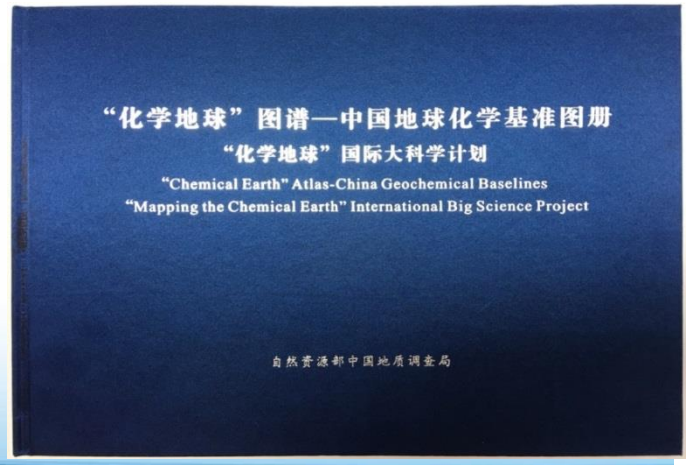
Global geochemical baselines networks covering approx. 31% of the world‘s land with， a total of 31.50 million square kilometers

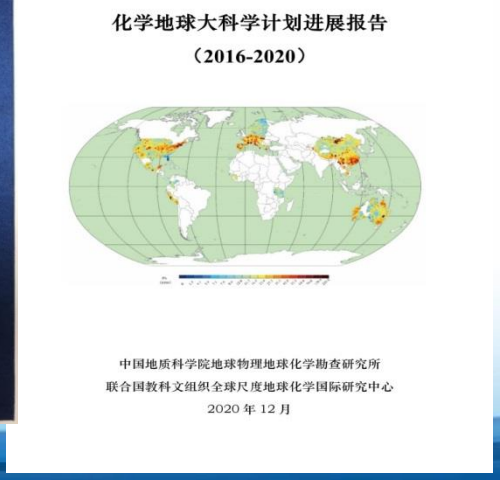


Global Sampling Progress





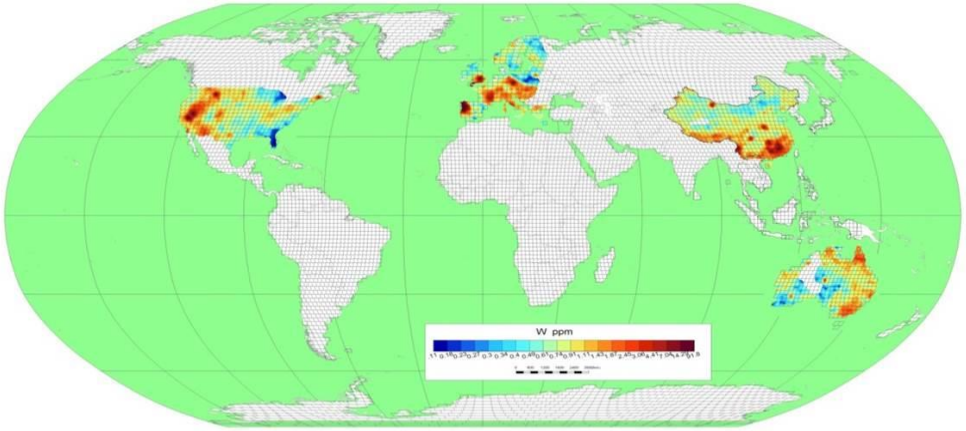


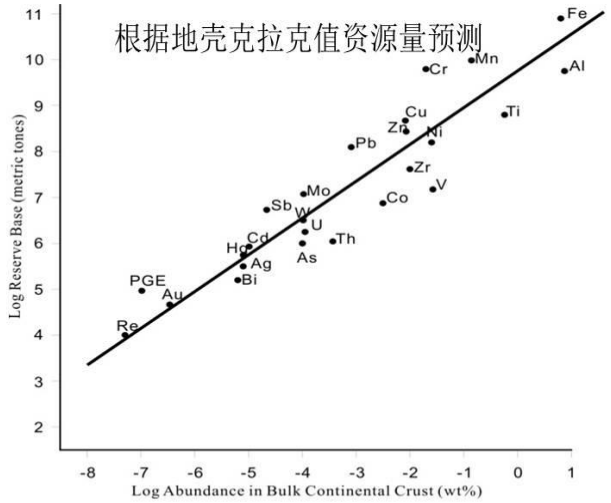


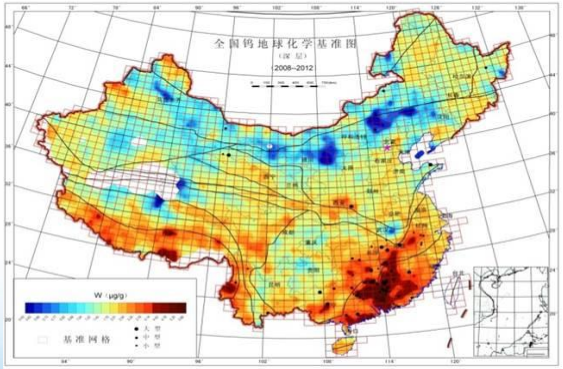
进展Progress

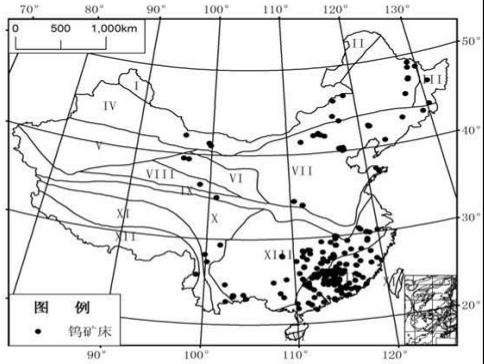
4. 关键资源评价应用
Application in Assessment of Critical Mineral Resources

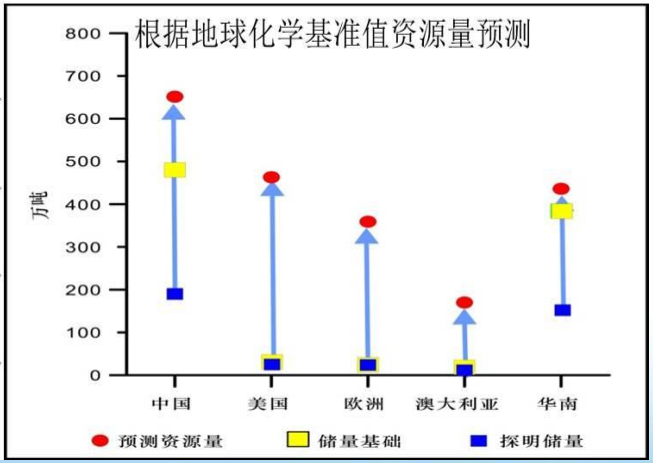
Geochemical baselines used to estimate global resource reserves







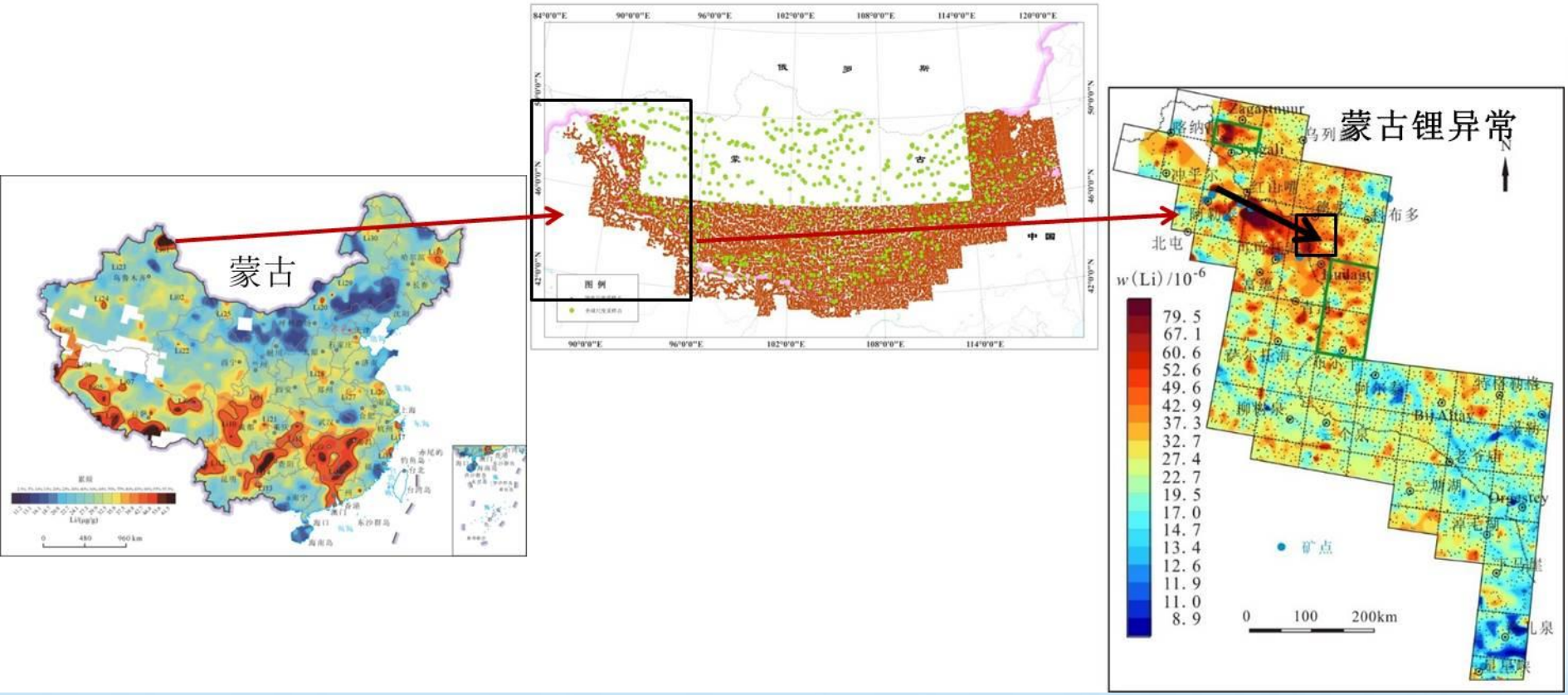




进展Progress

4. 关键资源评价应用
Application in Assessment of Critical Mineral Resources

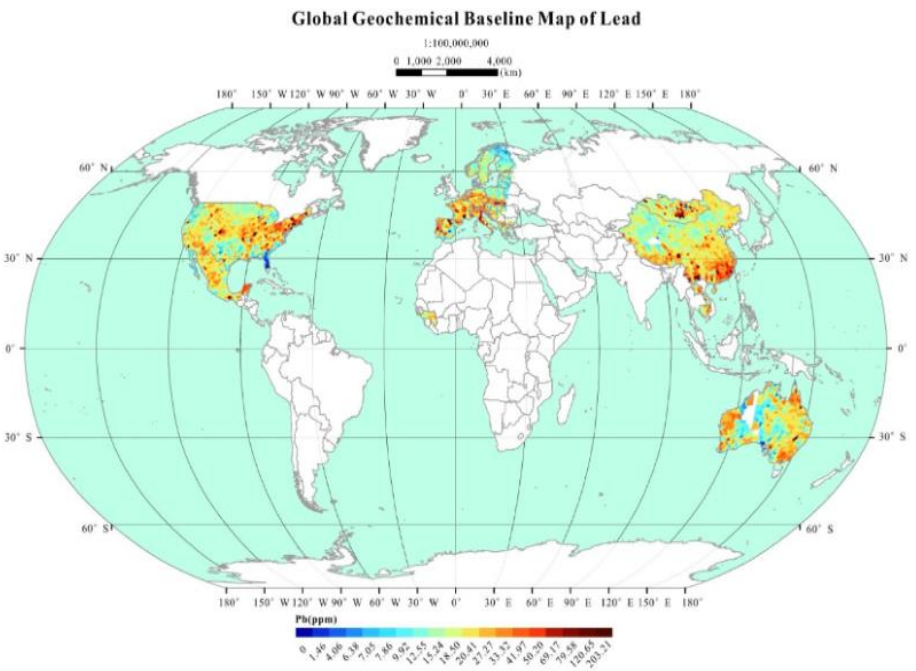
- 中蒙边境锂矿地球化学远景区预测
  可可托海锂成矿带异常进入蒙古境内
- Lithium targets delineated by geochemical mapping in the boundary region of China and Mongolia

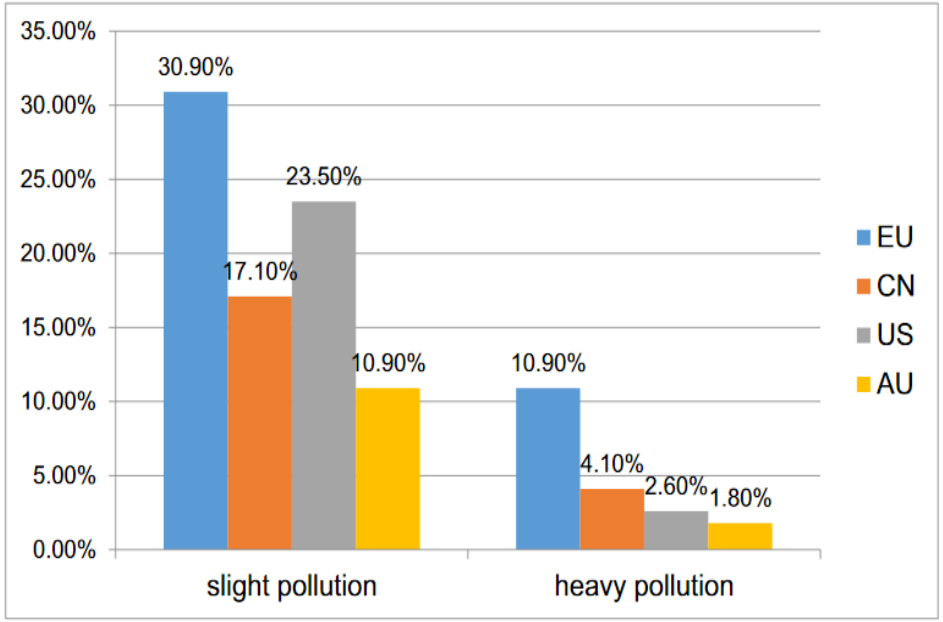


进展Progress

5. 环境化学基准与变化监测
Initiative creation of Global Environmental Geochemical Baselines and Monitoring Environmental Changes

Monitoring toxic metal pollution of Cd, Hg, As, Sb, Pb, Zn, Cr, Co, Ni, V





Percentage of top samples with toxic metal values exceeding risk limits of soil environment quality standards in China (GB 15618-1995).

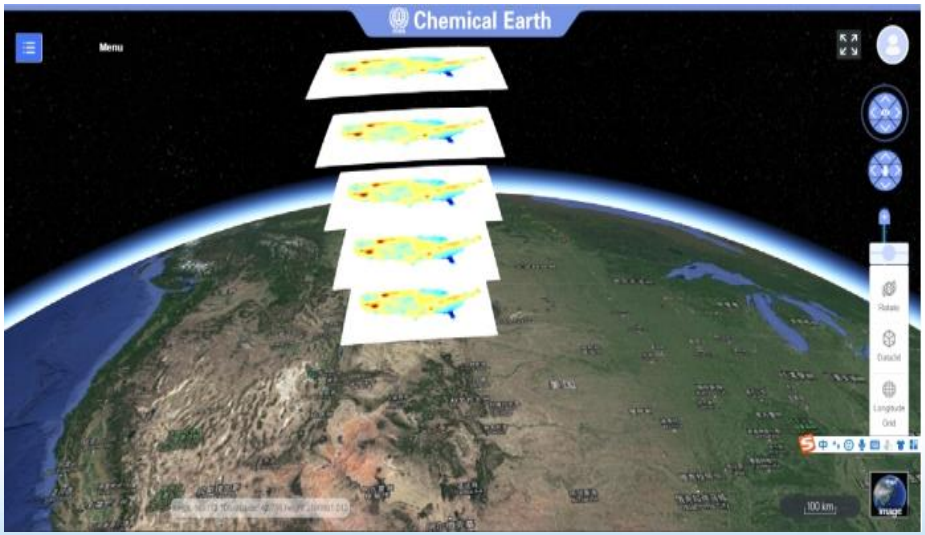
网站建设与数据分享
Website and Big Data

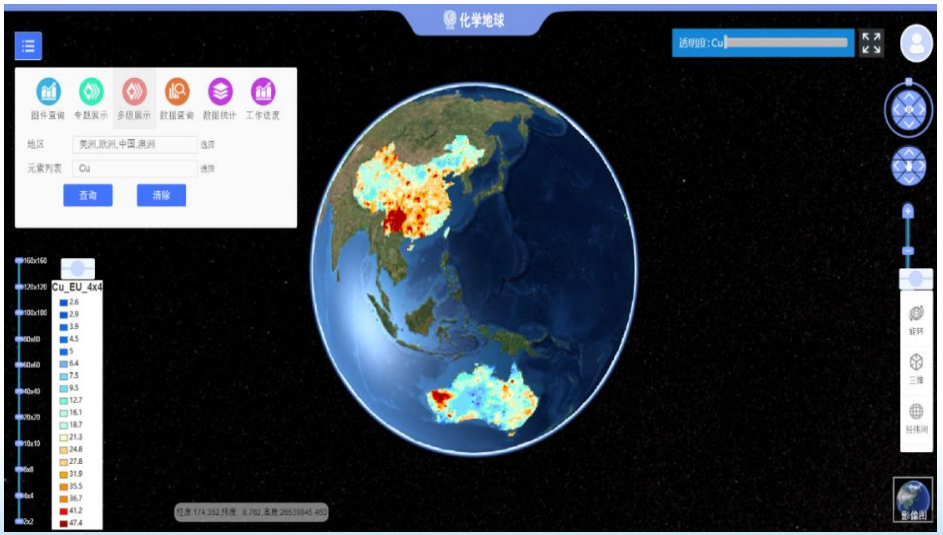
5. The internet-based big data website ‘Chemical Earth’

Establish database for 8 layers :

- 80kmx80km grid(global)
- 40kmx40km grid (global)
- 20kmx20km grid (Belt and Road)
- 10kmx10km grid (key countries)

4kmx4km grid (region)
2kmx2km grid (region, key areas)
1kmx1km grid (key areas)
0.5kmx0.5km grid (mining areas, industrial parks)





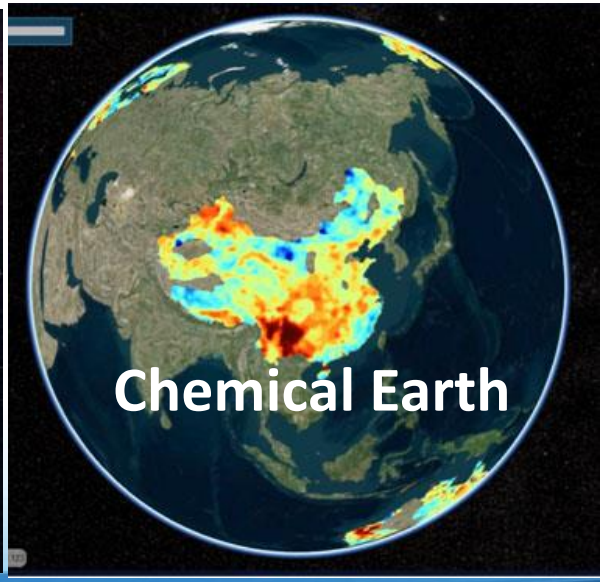
网站建设与数据分享

Join in the Group on Earth Observations (GEO)

In July 2021, GEO recognized ICGG as a Participating Organization at the 55th GEO Executive Committee.

- **“Digital Earth” Global big data are critically needed for better understanding of the earth, for solving major issues on global resources and environments, and for harmony between man and nature.**
- **There are many kinds of Digital Earth characterized by physics, such as Google Earth, and OneGeology, but digital Earth characterized by chemistry are unavailable until now.**
- ***Mapping Chemical Earth* will provide global geochemical observation data.**

Digital Earth



网站建设与数据分享
Website and Data Sharing

通过网站共享和合作国家地质调查局双边分享。

数据分享：15个国家，30TB

Data sharing：30 TB, 15 countries

Country data	data volume (items)	Country data	data volume (items)	Country data	data volume (items)
China	273280				
Colombia	51680	Ethiopia	146694	Pakistan	295113
Peru	21280	Cambodia	129859	Kyrgyzstan	123165
Turkey	11502	Papua New Guinea	104605	Tajikistan	91287
Laos	146503	Indonesia	214866	Madagascar	396405
Mongolia	661340	Uzbekistan	74834		

Website and Data Sharing

科普
Science Popularization

Six granpopular science activities were held, with more than 2,000 people participating. Published 4 popular science articles and 2 science popularization video on Xinhua net.

国际培训
International Training and Education

From 2016 to 2021, ICGG held 29 training workshops or activities in China and abroad. ICGG actively carried out theoretical and technical training on geochemical mapping, laboratory analysis and testing home and abroad and trained a total of 805 trainees from 52 countries on 6 continents in all. Of which, 8 training courses were held in China for domestic and overseas geochemical scientists and technical staff, 338 participants were trained, 20 training activities were held abroad during project implementation.

国际培训
International Training and Education

International Training

Training course held in Cambodia, November 2016.

Workshop on global geochemical mapping held during 35th IGC, Cape Town, South Africa, 30-31 August 2016.

Training course held at Geological Survey of Iran, October 2016.

野外培训，柬埔寨，2016 年 11 月

Group photo of workshop participants in the 35th IGC field training course, Cape Town, South Africa,31 August 2016.

Geochemical sampling demonstration, Iran, October 2016.

Training course held in Laos, November 2016.

Lecture on analytical techniques of geochemical mapping samples in MTA, Turkey, 7 December 2016.

Joint geochemical sampling in Laos, December 2016.

Joint geochemical sampling in Mongolia, August 2016

Joint geochemical sampling in Russia, November 2016

Joint geochemical sampling in Turkey, December 2016.

Field sampling demonstraation

Alecos Demetriades giving a presentation

Joint field sampling in Peru

Global-scale geochemical mapping sampling

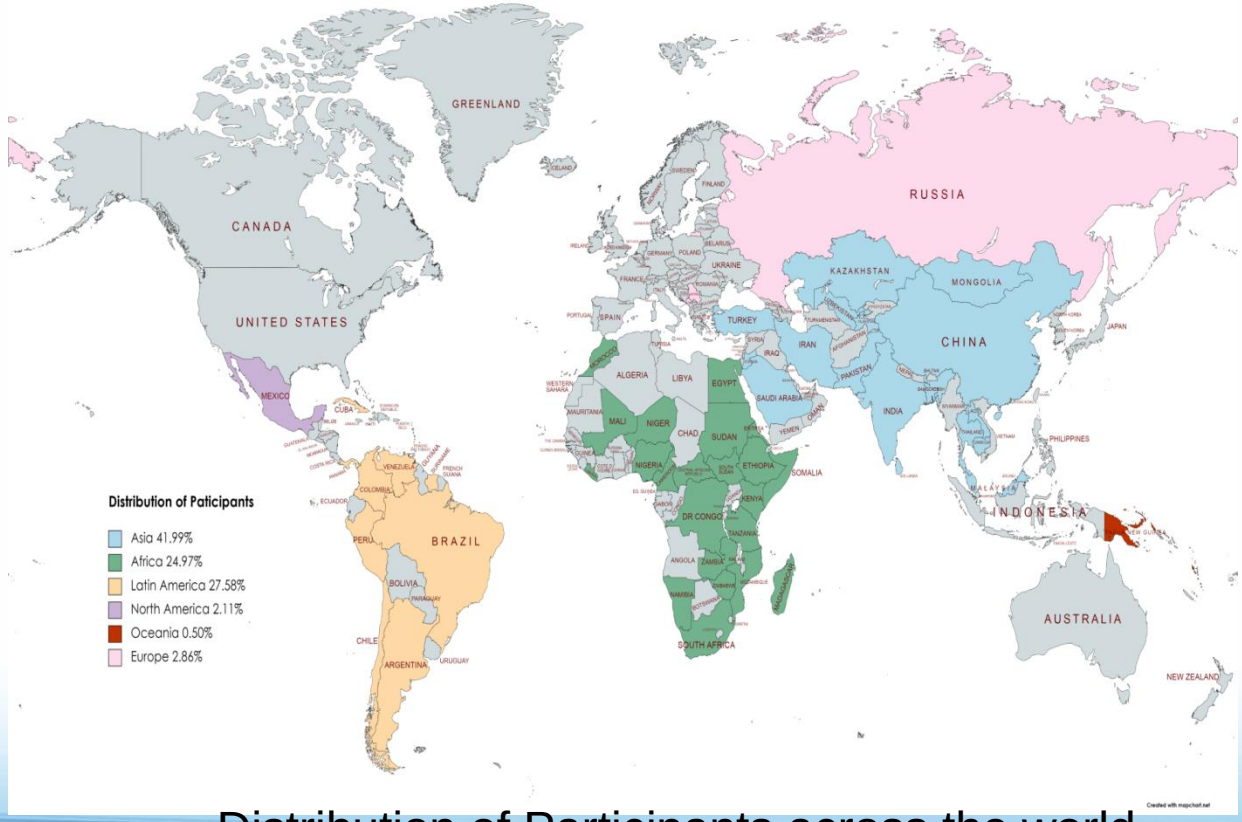
Joint field sampling in Laos

Prof. Wang Xueqiu giving a presentation

2019 Field Sampling Training in Laos

国际培训
International Training and Education

There are 338 students (41.99%) from 14 Asian countries; A total of 201 students (24.97%) from 22 countries were from Africa; 222 students (27.58%) from 9 countries in Latin America; North America A total of 17 trainees (2.11%) from 2 countries; a total of 4 trainees from 2 countries in (0.50%); Europe A total of 23 trainees (2.86%) from 3 countries. Among them, there are 72 female students, accounting for 8.94% of the total number.



Distribution of Participants across the world

访问学者
Visiting Scholar program

ICGG has attracted a number of outstanding international scientists to the center for cooperative research. From 2016-2021, it has accepted 18 international scientists as short-term visiting scholars to learn geochemical mapping knowledge and technology.

Dr. Finkelman making a presentation

Dr. Blinda making a presentation

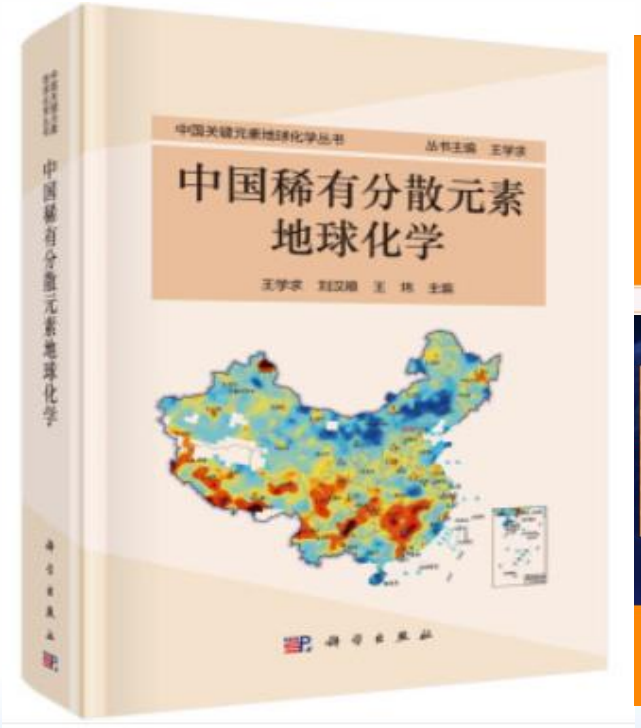
Prof. Jennifer McKinley exchanging with ICGG staff

Dr. Zhang Chaosheng exchanging with young scientist

Dr. Ravinder Raj Anand making a presentation

出版
Publications

- 著作1本
- 出版文集2期9（中、英文集各1期）
- 发表论文（2016-2020）：176篇
- 发表论文（2019-2020）：59篇



Publications

获得国际奖章与奖励
International Medals and Prize

问题与挑战Challenges

- International travel problems by Covid-19 pandemic
- World-wide participation in Mapping Chemical Program to be supported by governments
- Next 6-years agreement to be signed

未来愿景Outlook

- 全球地球化学填图是一项研究与应用紧密结合的大科学工程，需要世界各国的广泛参与，建立双边、多边、科学家个人多种形式广泛参与的国际合作网络。
- **Mapping Chemical Earth Program is a big science project. All countries and scientists in the world are welcome to participating in the program.**
- 建立智能化实验室与大数据平台，适应信息化和人工智能时代要求。
- **Establishment of intelligent laboratory and big data website**
- 将研究与应用紧密结合，更好地服务于全球环境变化和全球资源评价需求。
- **Promotion of the close combination of research and application**

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谢谢
Thanks

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