



**International Symposium of the
Category 2 Institutes and Centres
under the auspices of UNESCO
in the field of Natural Sciences**

International Centre on Global-Scale Geochemistry

under the auspices of UNESCO

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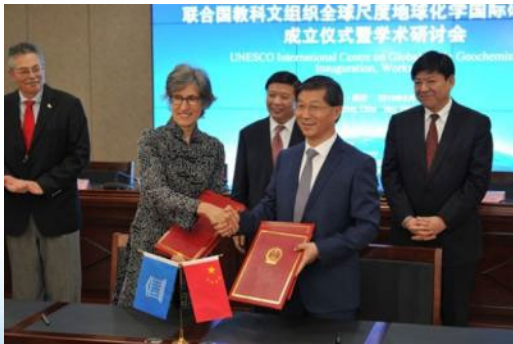
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**15 – 17 May 2024,
Kuala Lumpur,
Malaysia**



Brief Introduction to the ICGG

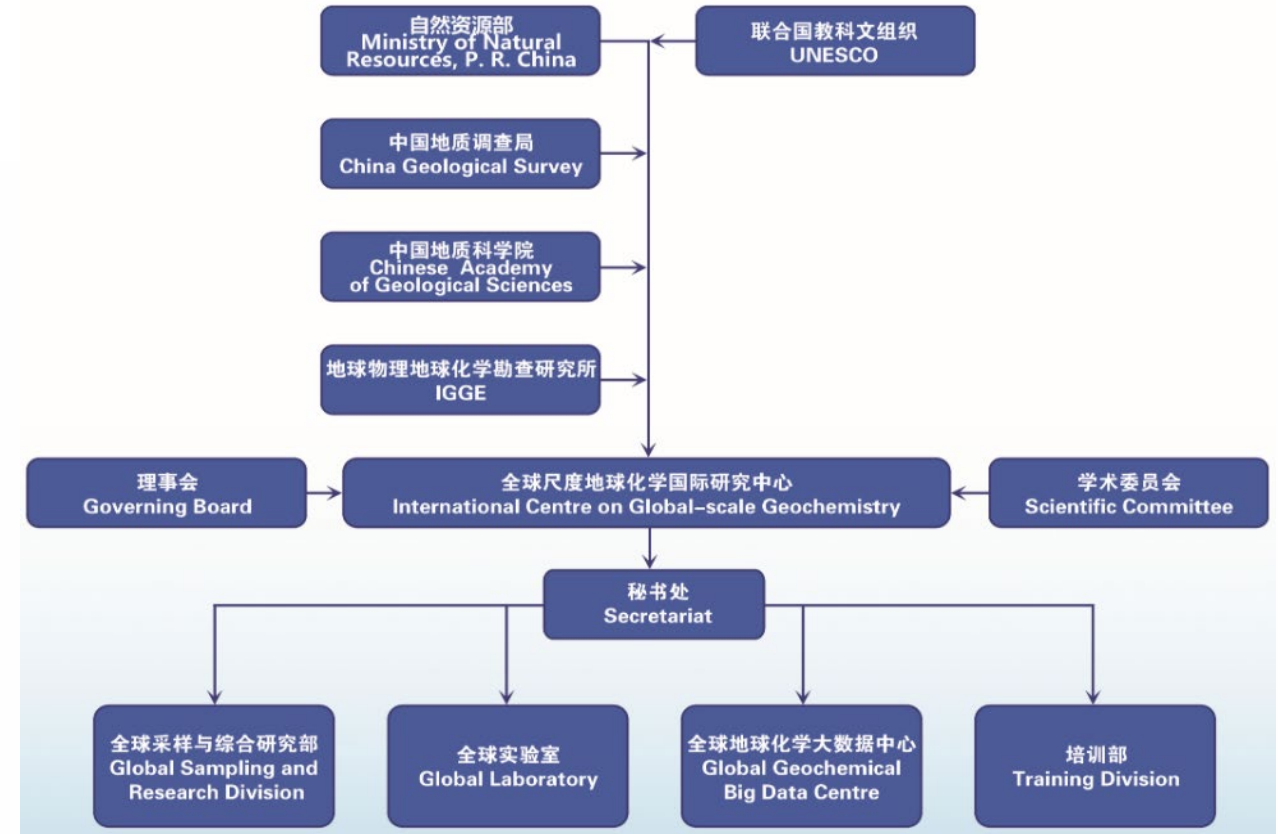
- ◆ The UNESCO International Centre on Global-Scale Geochemistry (ICGG) was established in 2016 on the approval of the UNESCO and the Government of the People's Republic of China.
- ◆ In 2023, the ICGG renewed the Tripartite Agreement with the the UNESCO and the Chinese Government.
 - ❑ November 2013, the 37th UNESCO General Conference approved the establishment of the Center.
 - ❑ September 2015, the China State Council officially approved the establishment of the Centre.
 - ❑ May 12th, 2016, the inauguration of ICGG was held in Langfang. The Chinese government signed the Agreement with the UNESCO initiated the international scientific cooperation project "*Mapping the Chemical Earth*".
 - ❑ June 30th, 2023, the ICGG signed the Tripartite Agreement between the UNESCO and the Chinese Government.





Location of the ICGG

Organization Chart





Goals of the ICGG

1. Foster knowledge production

- Foster knowledge production and use of technology, standards or guidelines in global-scale geochemistry for sustainable global development in the field of natural resources and environments

2. Implement the “Chemical Earth” International Big Science Program

-An initiative program launched and implemented by the ICGG over the last six years, and that focuses on providing global-and national-scale geochemical data and maps for sustainable development of global natural resources and environment

3. Implement the Group on Earth Observations (GEO) work programme

- “Global Geochemical Observation Network and Digital Chemical Earth”, which was approved by the GEO-18 Plenary in 2022.



Goals of the ICGG

4. Establish the global geochemical baselines networks

- Establish the global geochemical baselines networks and the China geochemical observation networks, which document the content and distribution, baselines and changes of chemical elements on the Earth surface

5. Provide training

- Provide training on the latest global-scale geochemical knowledge and technologies to postgraduates and researchers and provide assistance to developing countries on global- and national-scale geochemical mapping

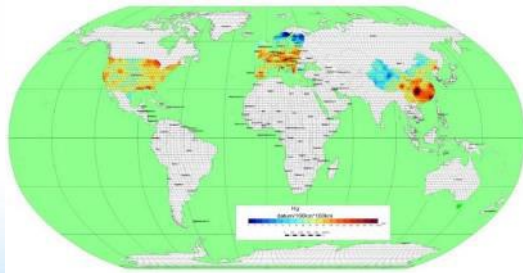
6. Establish the “Chemical Earth” big data platform

- provide equal access to global-scale geochemical data service and build a bridge between the scientific community, policymakers and the general public

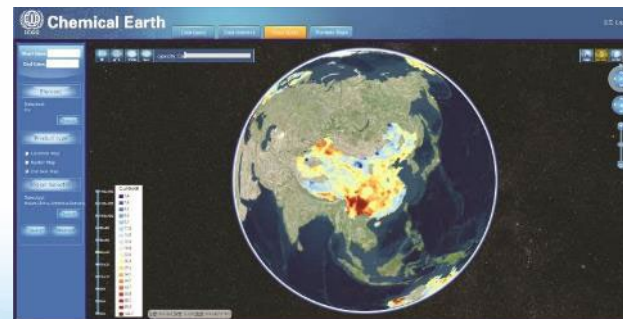


Functions of the ICGG

- ❑ **Standardize methods and guidelines** for global geochemical baselines and geochemical observation networks to provide reference data accompanying maps for monitoring future chemical changes of the Earth's pedosphere;
- ❑ **Certify baselines of chemical parameters in soils** for green land use and sustainable agriculture;
- ❑ **Implement global geochemical baselines programmes** for securing funds, managing and coordinating these activities according to scientific guidelines determined by the ICGG's scientific committee, cooperating with external advisory experts;
- ❑ **Transfer global-scale geochemical methods** to developing countries and to facilitate capacity building in these countries in application of geochemical databases and maps to mineral resource investigations, global climate change studies, and research on environmental effects of agricultural practices, etc.



Global Mercury Geochemical Map

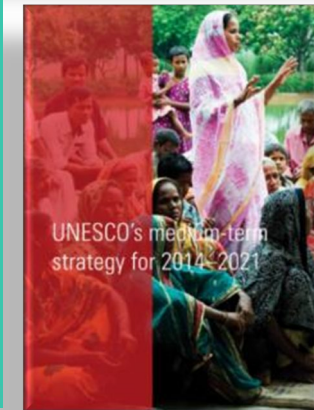


"Chemical Earth" platform



Accordance with the following strategies

- ❑ United Nations 2030 Agenda for Sustainable Development
- ❑ UN International Decade of Sciences for Sustainable Development
- ❑ UNESCO 2019 C2C STRATEGY
- ❑ UNESCO Medium-term Strategy (2022-2029)
- ❑ IUGS “Resourcing Future Generations”
- ❑ International Council for Science Project "Future Earth "
- ❑ ICGG International scientific cooperation programme “Chemical Earth”



Resourcing Future Generations:



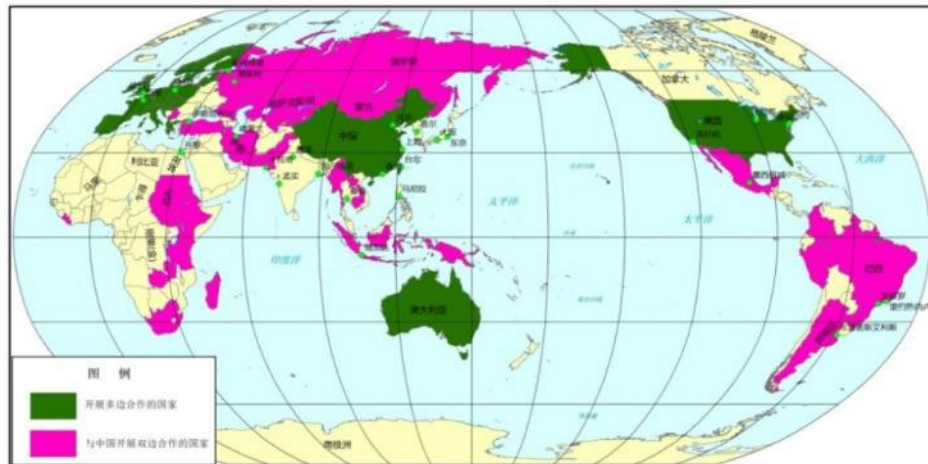
A Global Effort to Meet the World's Future Needs Head-On



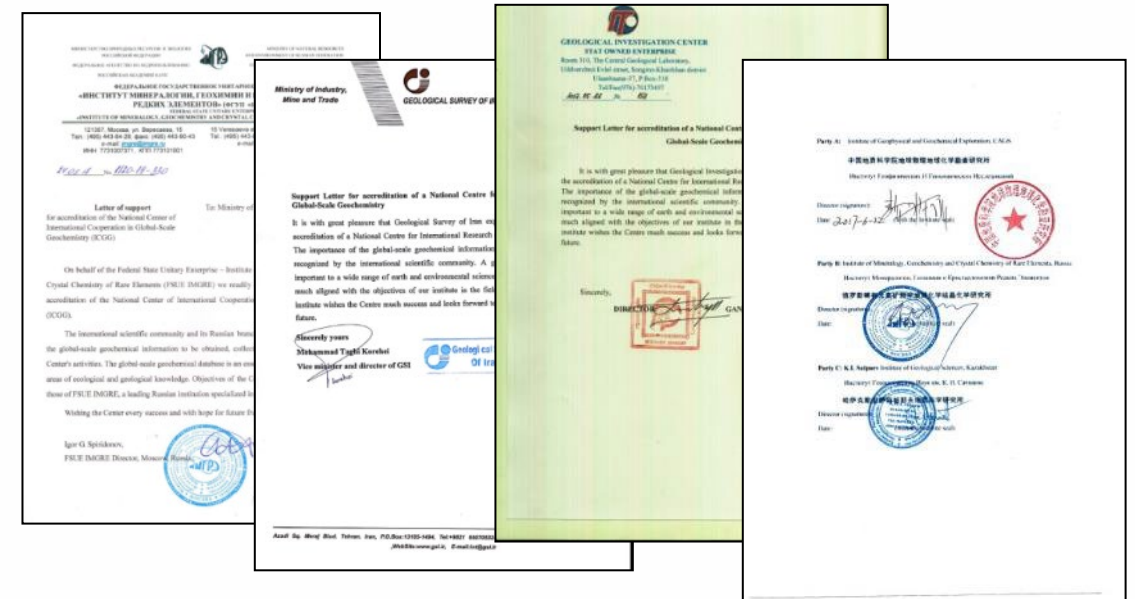
Initiative and Implementation of the international ‘Big Science’ project - *Chemical Earth*

“*Chemical Earth*” is an international scientific cooperation project to map and document the concentrations, distributions, baselines of all naturally occurring chemical elements on the Earth for sustaining natural resources and environments.

- ❑ Established cooperative networks: 57 countries
- ❑ Signed bilateral cooperation agreements: 28 countries



International Cooperation Network

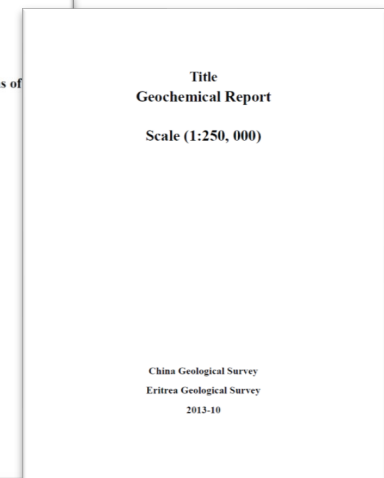
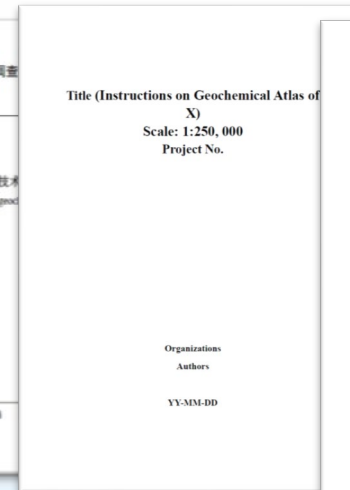
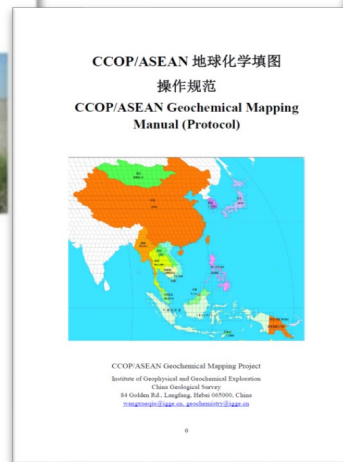


Part of the Signed Agreement



Develop international geochemical mapping technical guidelines which has played a leading role across the world

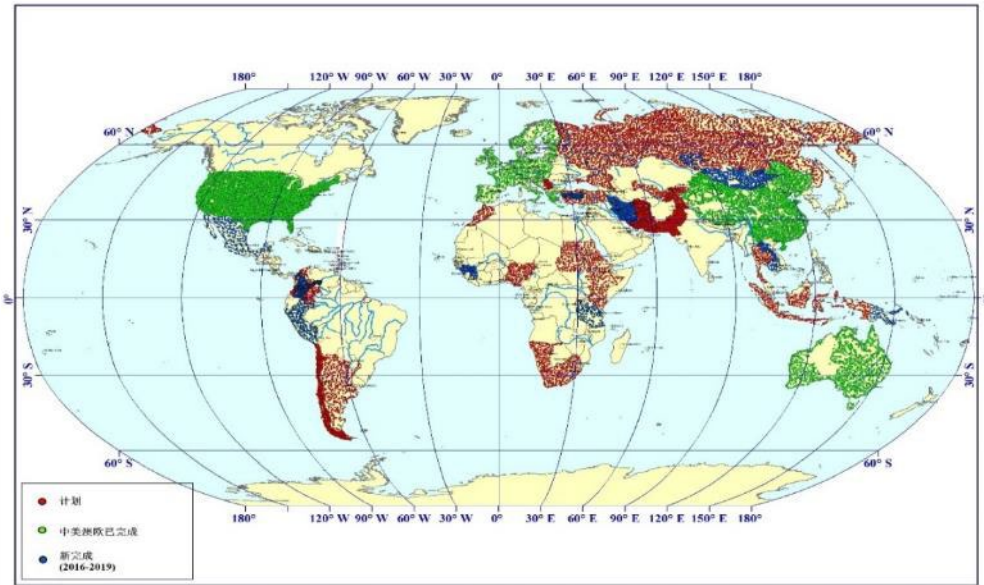
- ❑ Developed geochemical sampling methods for different landscapes and formulated 7 International Geochemical Mapping Guidelines.
- ❑ The Global Geochemical Baselines Guidelines has been approved by ICGG Scientific Committee as the international standard.
- ❑ The sampling method of the Gobi desert area has been adopted as an international standard and has been promoted and used in 11 countries.



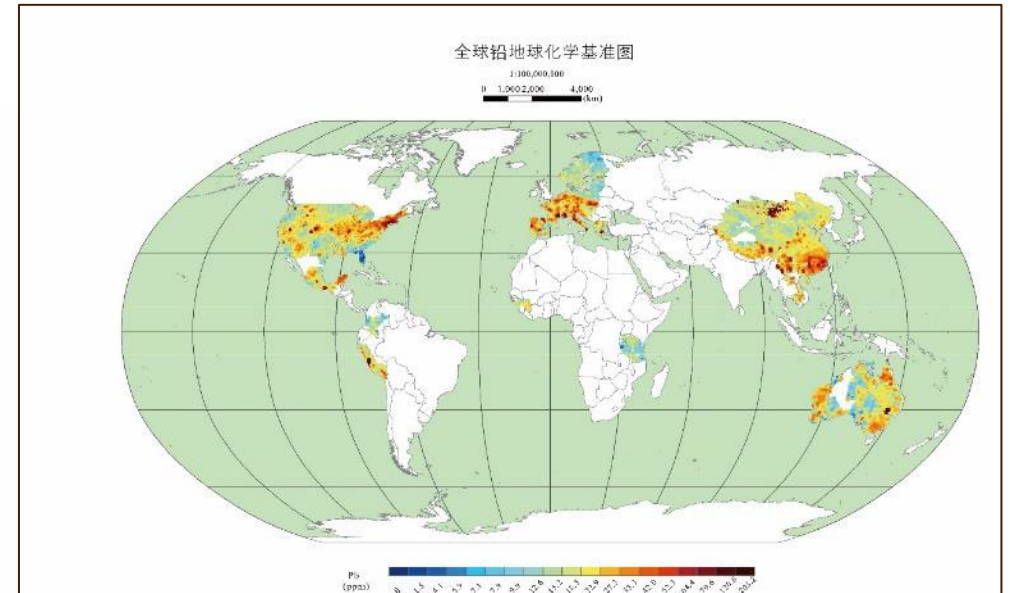


Significant progress of Global Geochemical Baselines Project

The global geochemical baseline network has covered a total area of 36.50 million square kilometers, taking up approximately 33% of the world land area.



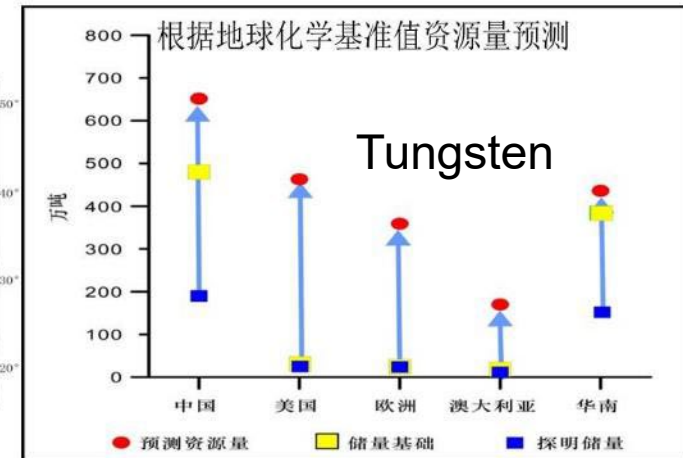
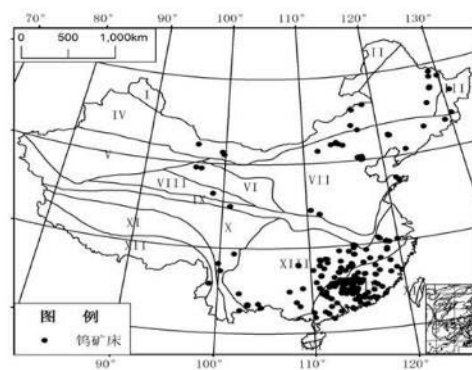
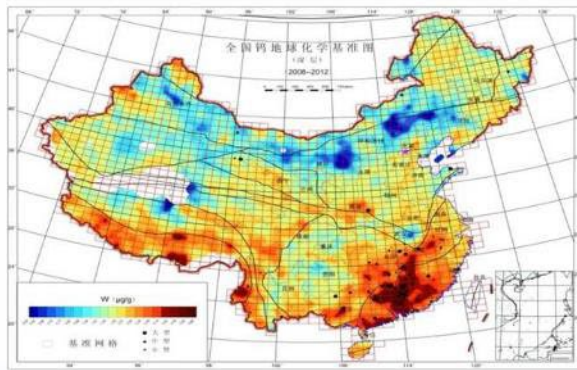
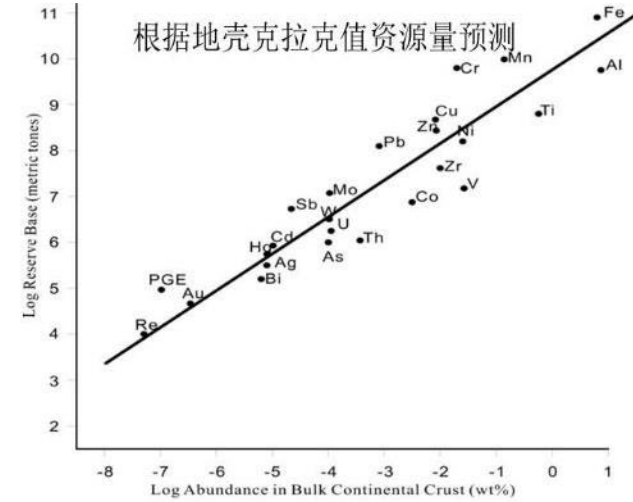
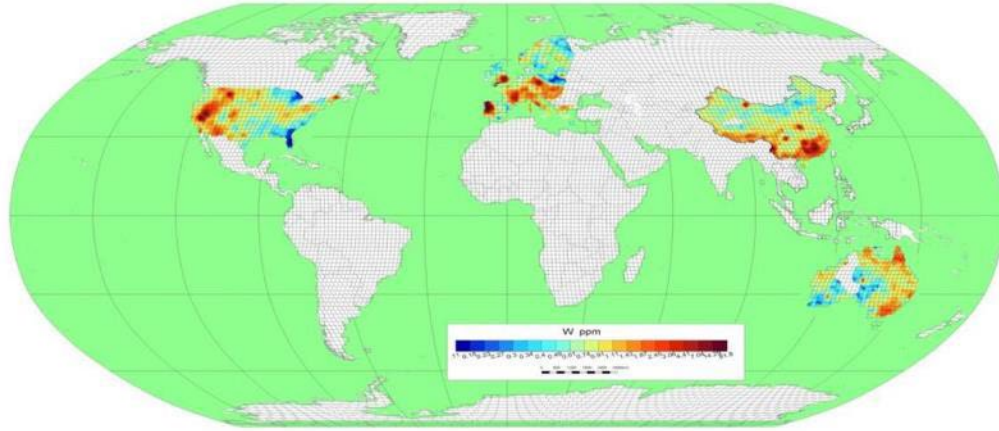
Progress of the Global Geochemical Baselines Project
(The red sampling points are the selected sampling points, the green points were sampled before 2016, the blue points were sampled during 2016-2024)



Global geochemical baselines map of Lead

Significant progress of Global Geochemical Baselines Project

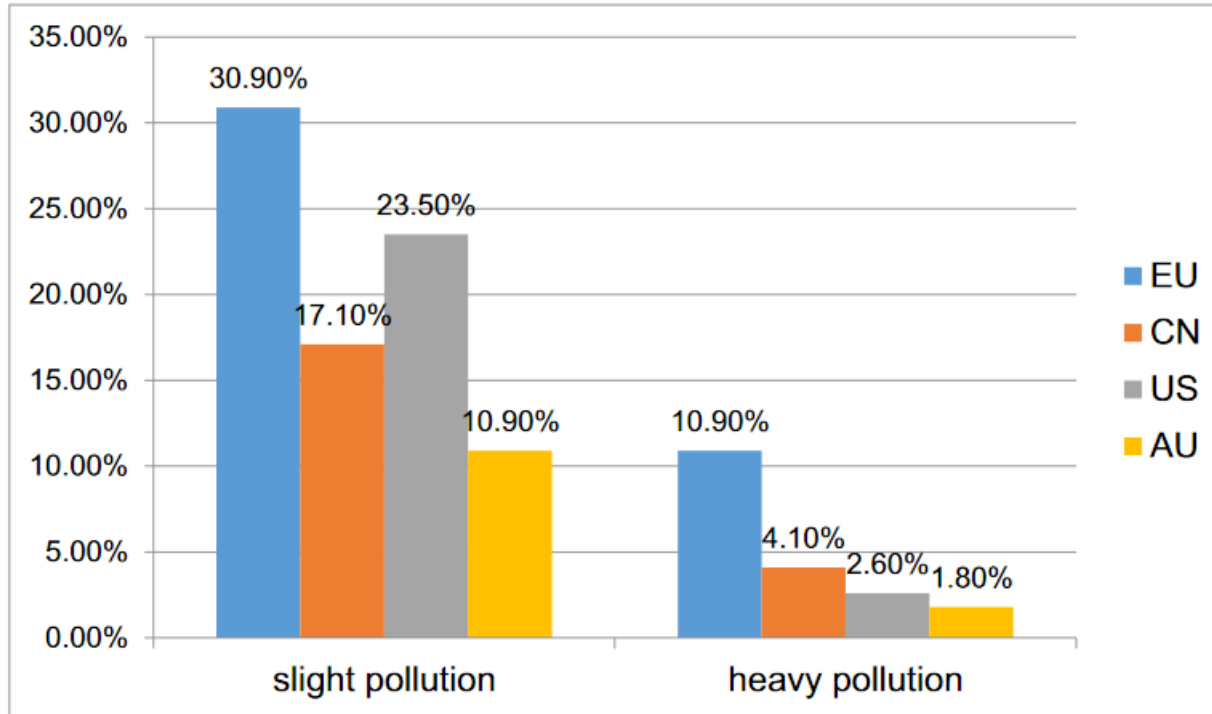
Geochemical baselines applied in global resource evaluation



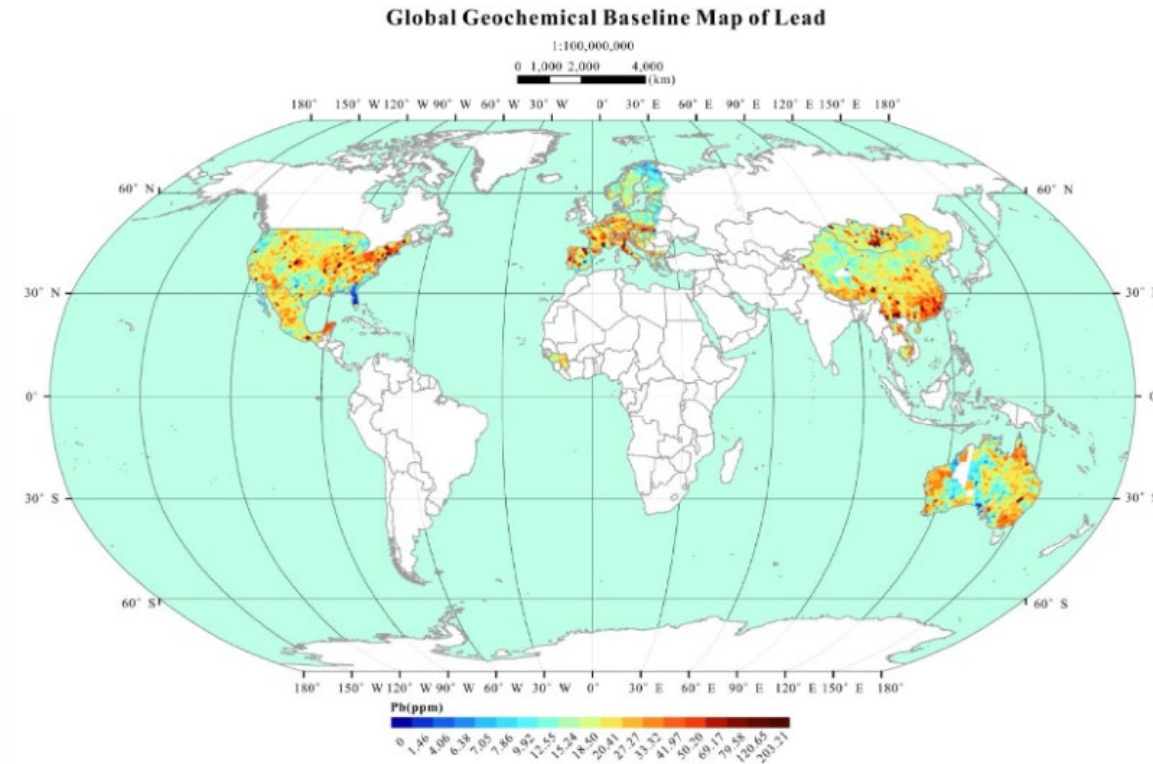
China geochemical baselines map of Tungsten

Significant progress of Global Geochemical Baselines Project

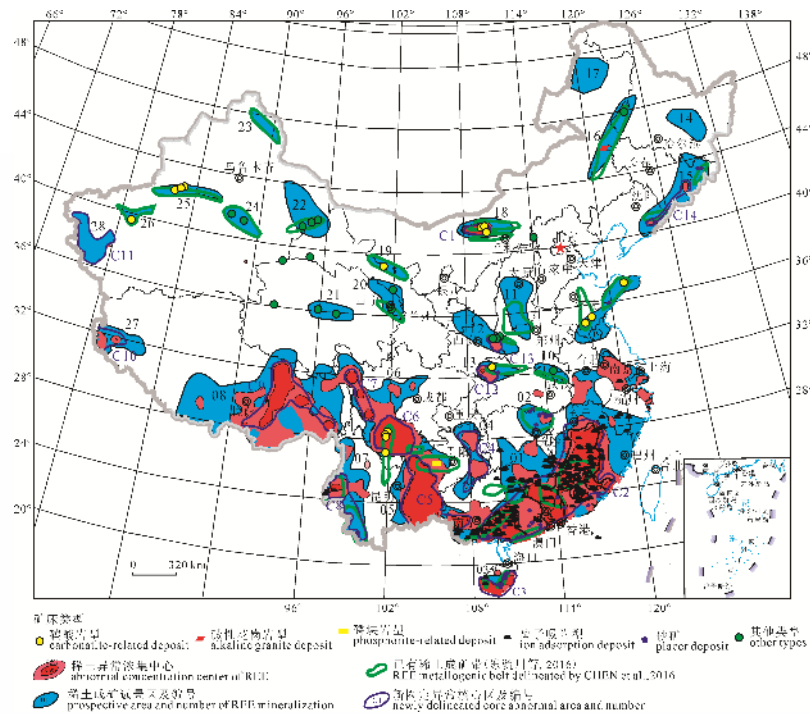
Geochemical baselines used for monitoring heavy metal pollutions of Cd, Hg, As, Sb, Pb, Zn, Cr, Co, Ni, V



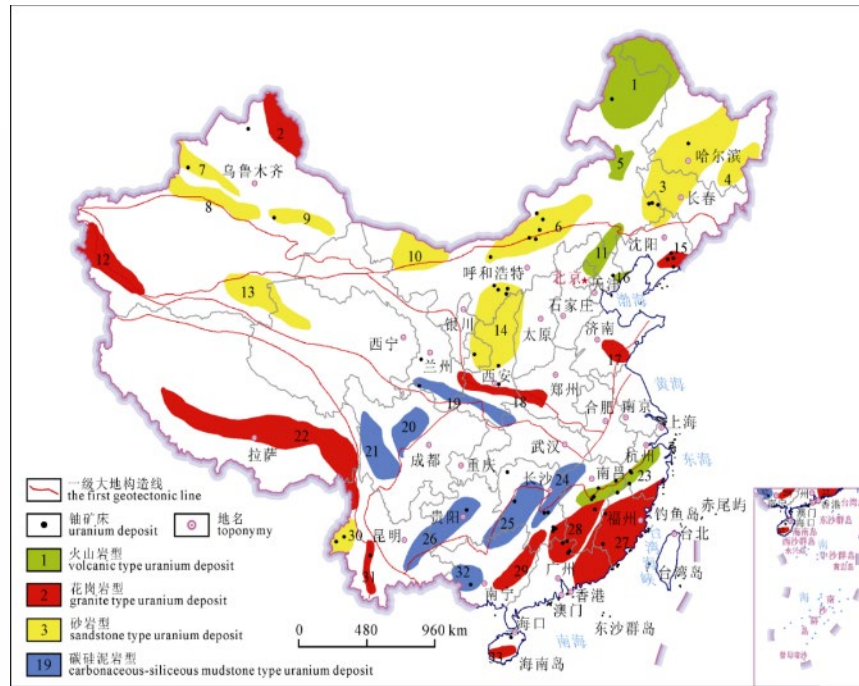
Percentage of top samples with toxic metal values exceeding risk limits of Soil Environment Quality Standards of China (GB 15618-1995).



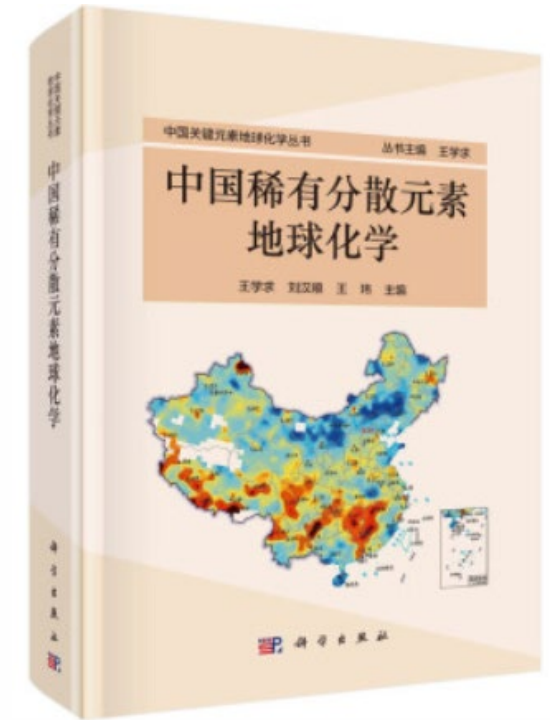
Geochemical baselines used for prospecting key mineral resources



China's REE mineralization prospecting areas



China's uranium mineralization prospecting areas

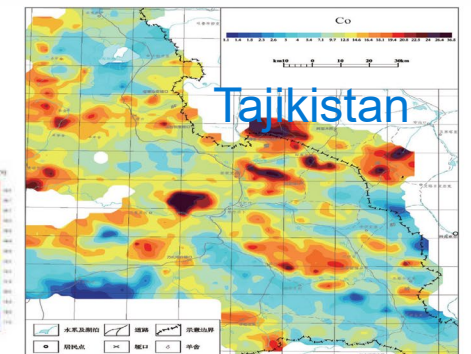
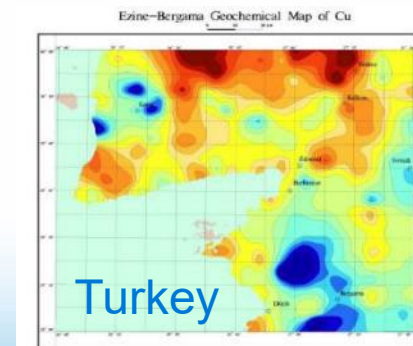
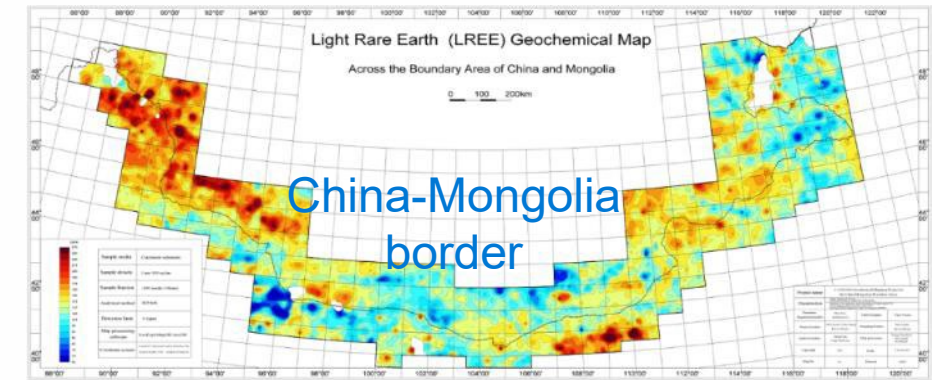
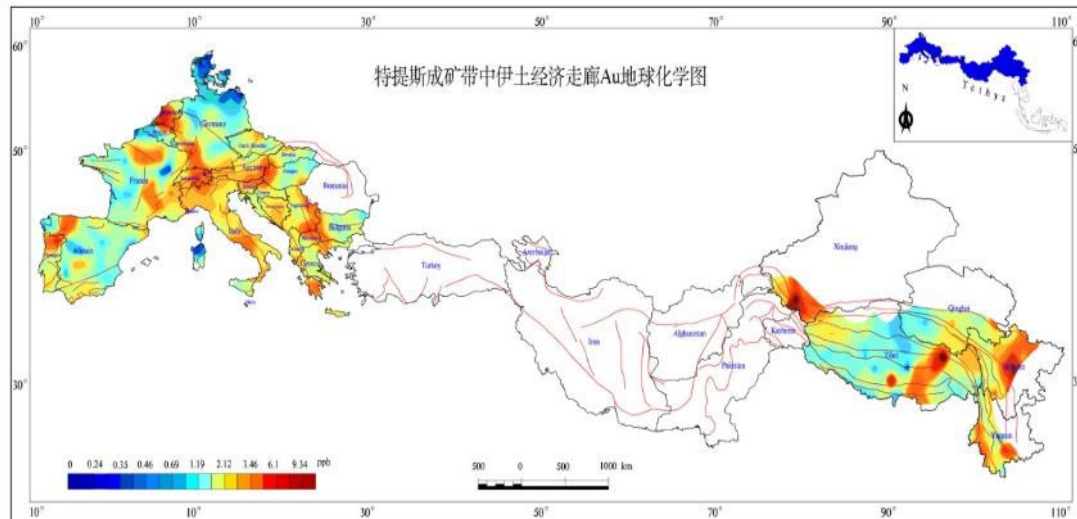


Publication

Geochemical mapping cooperation with the "Belt and Road" countries

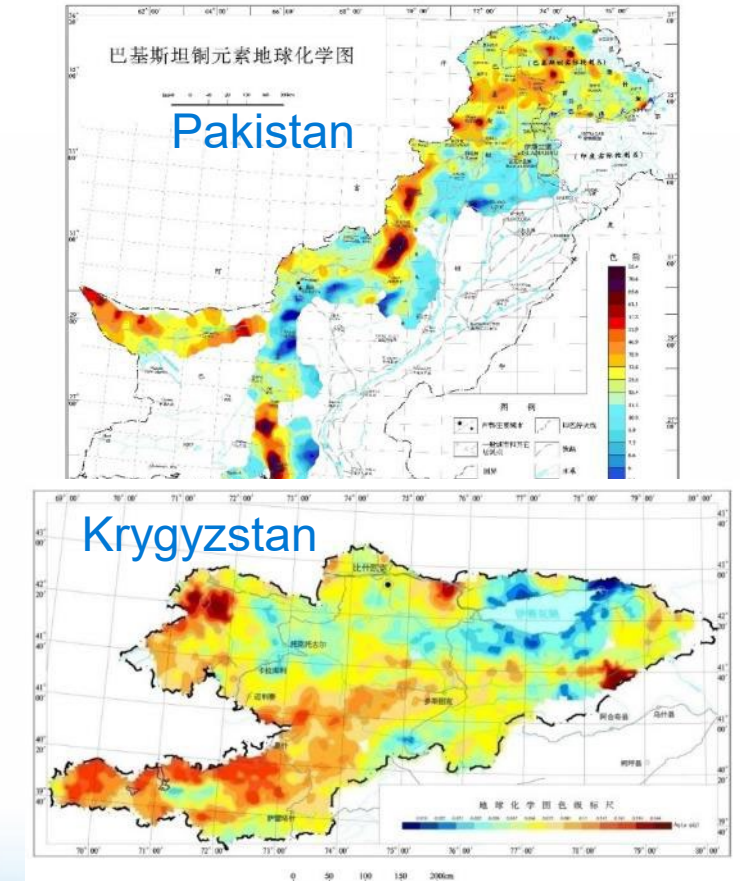
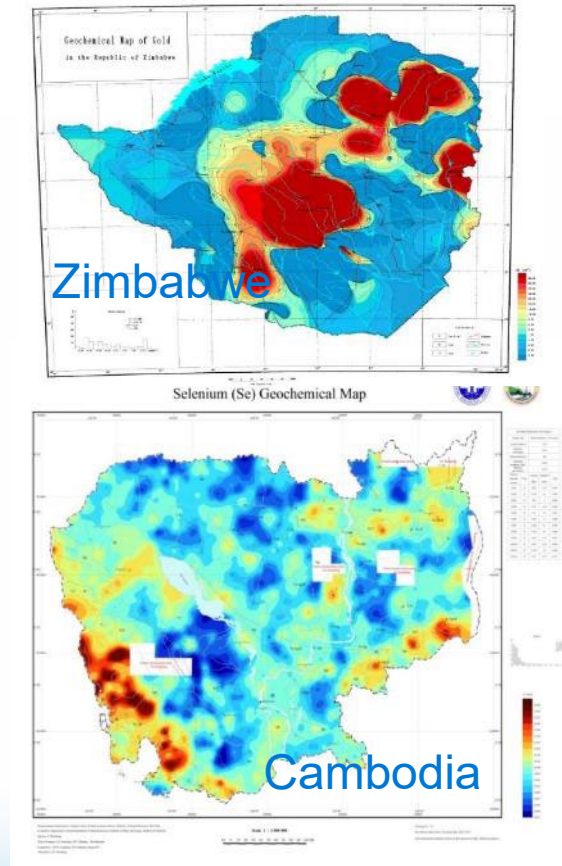
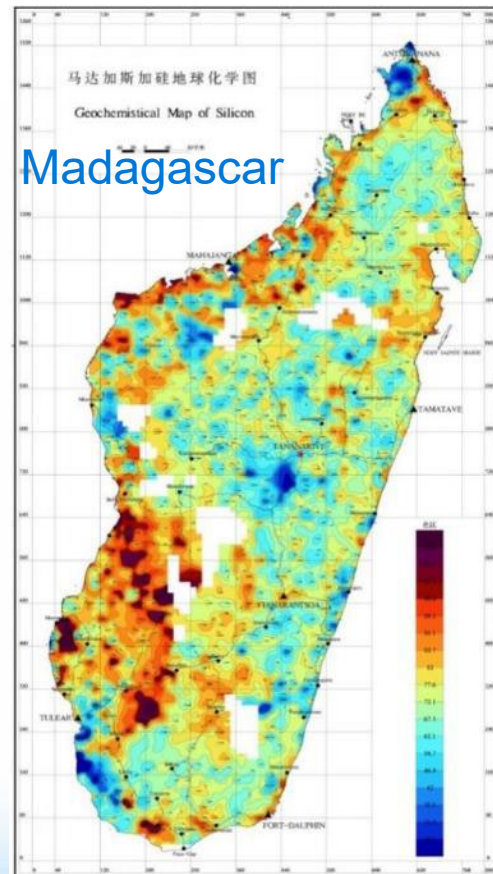
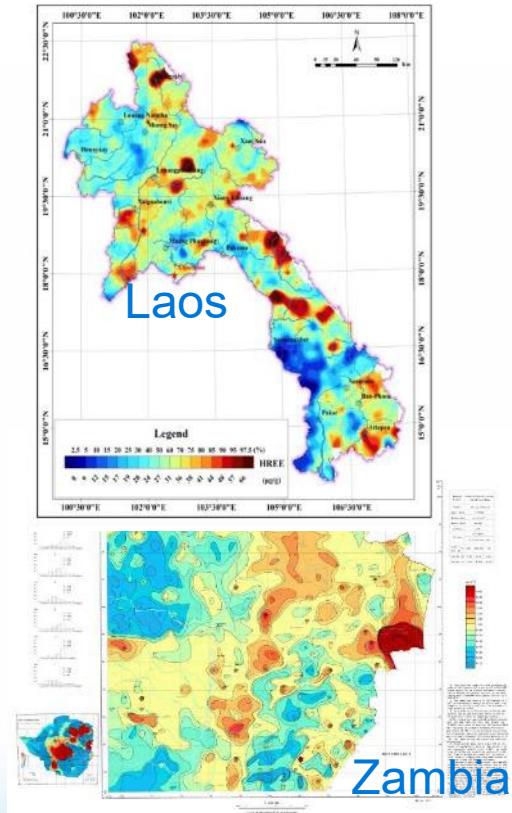
ICGG has widely conducted the win-win cooperation with the 'Belt and Road' countries on geochemical mapping to protect mineral resources and environments, which has covered an area of 3.5 million square kilometers in the key "Belt and Road" countries.

It has compiled the 1:1 million geochemical atlases of Mongolia, Turkey, Laos, Cambodia, Madagascar, Uzbekistan, Kyrgyzstan, Tajikistan, Pakistan, Tanzania, Eritrea, Papua New Guinea ,etc., the 1:5 million geochemical atlases of the main metallogenic elements in the Tethys metallogenic belt.



Geochemical mapping cooperation with the "Belt and Road" countries

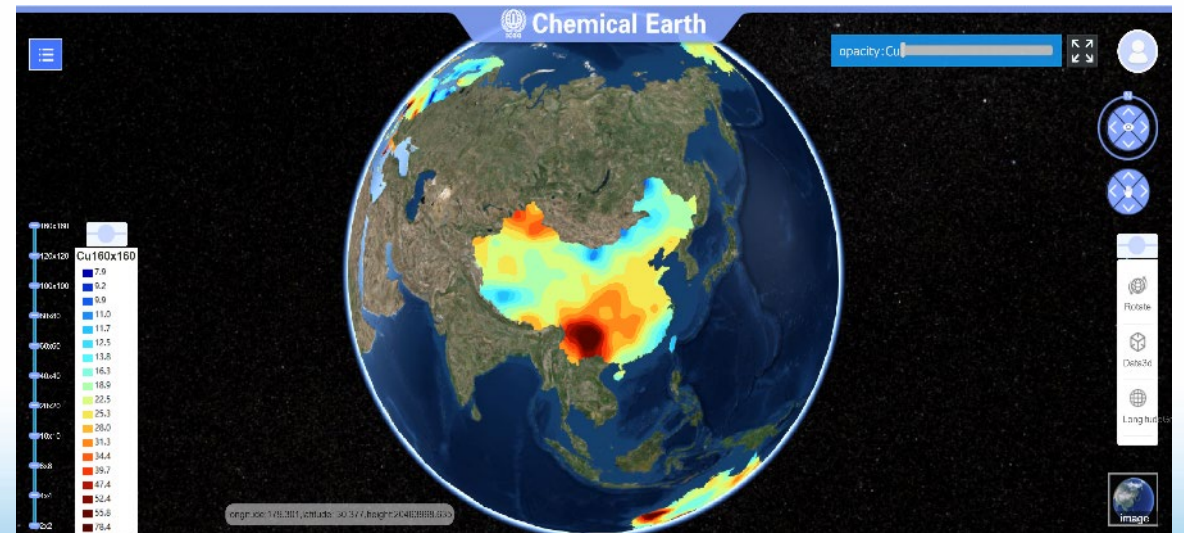
Through the cooperation projects, ICGG fosters geochemical knowledge and technologies for managing, evaluating and sustaining natural resources and environments for the cooperation countries.





Establishment of “Chemical Earth” website and data sharing

The Bilingual website of the ICGG, www.globalgeochemistry.com is functioning well. Viewers can also access *Chemical Earth* through this website. It has stored a total of around 150 million metadata, including the available global-scale geochemical data, national-scale and some regional-scale geochemical data of China. These data, amounting up to 30 TB, cover a variety of geochemical information, such as the original geochemical analyses, geochemical maps, photographs and videos of sampling sites, etc.,

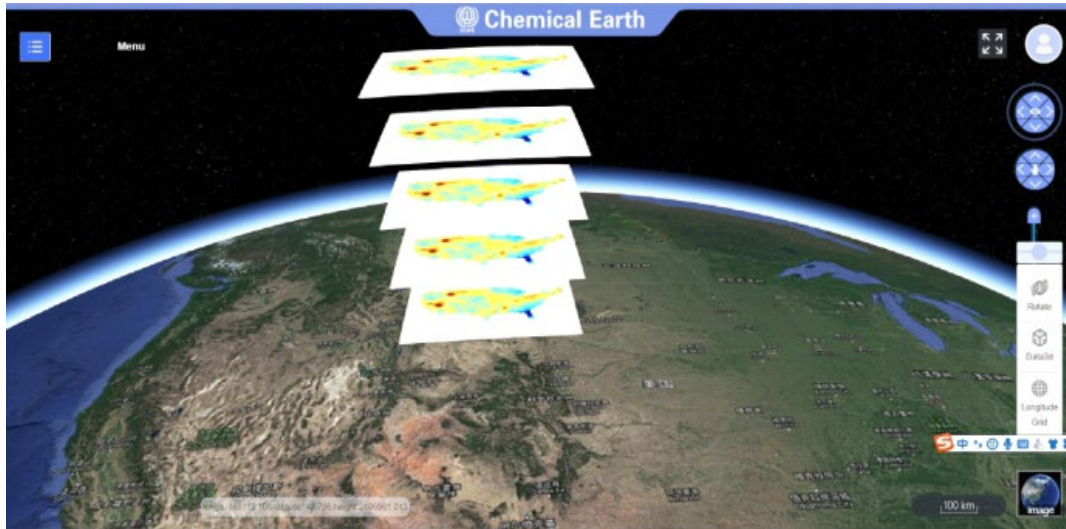




Establishment of “Chemical Earth” website and data sharing

Established the database of 8 scales:

- 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)



Internet-based big data website ‘Chemical Earth’ established by ICGG



International training and technic transfer

From 2016 to 2024, ICGG has held 32 training workshops or activities in China and abroad. ICGG has been actively carried out theoretical and technical training on geochemical mapping, laboratory analysis and testing home and abroad and trained a total of 1200 trainees from 52 countries in 6 continents. Of which, 10 training courses were held in China for domestic and overseas geochemical scientists and technical staff, with 93 people participating, 20 training activities were held abroad during project implementation.





International training and technic transfer



Training course held in Cambodia, November 2016.



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



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



Field sampling demonstration



Alecos Demetriades giving a presentation



Joint field sampling in Peru



野外培训，柬埔寨，2016年11月



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



Geochemical sampling demonstration, Iran, October 2016.



Chair: multi-professional mapping workshop



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.



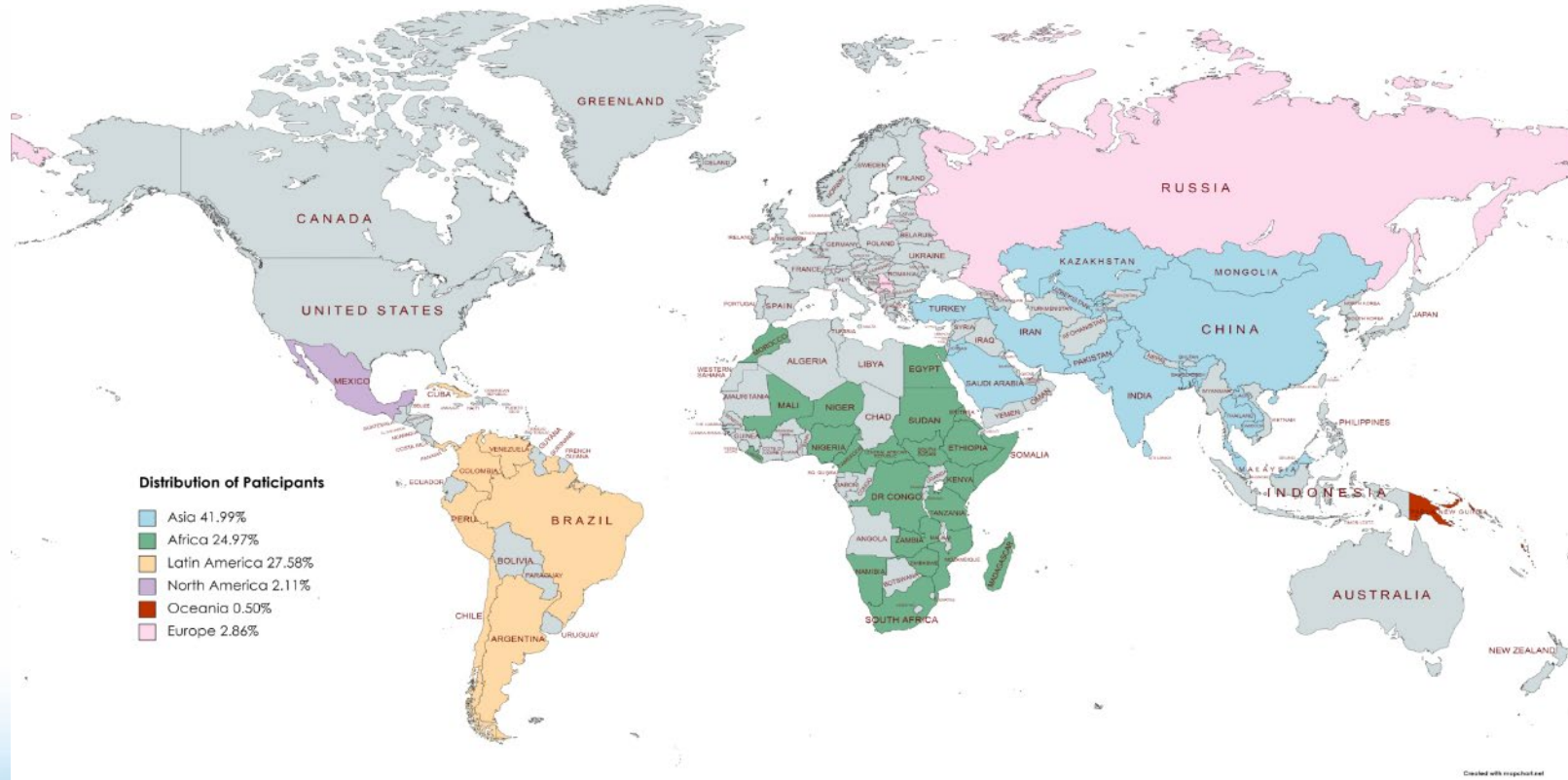
Prof. Wang Xueqiu giving a presentation



2019 Field Sampling Training in Laos

International training and technic transfer

There are 338 participants (41.99%) from 14 **Asian** countries; 201 participants (24.97%) from 22 **African** countries; 222 participants (27.58%) from 9 **Latin American** countries; 17 participants (2.11%) from 2 **North American** countries; 4 participants from 2 **Oceanian** countries(0.50%); 23 participants (2.86%) from 3 **European** countries. Among them, there are 130 **female students**, accounting for 11% of all.



Distribution of participants across the world



Visiting scholar program

ICGG has attracted a number of outstanding international scientists to the Center for cooperation research. In 2016-2024, it has accepted 22 international scientists as short-term visiting scholars for exchanging geochemical mapping methods and technologies.



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

- Held 6 big science popularization activities, attracting more than 2,000 participants
- Published 4 science popularization articles
- Promoted 2 science popularization videos through Xinhua net





Join in the Group on Earth Observations (GEO)

GEO is a unique global network connecting government institutions, academic and research institutions, data providers, businesses, engineers, scientists and experts to create innovative solutions to global challenges at a time of exponential **data** growth, human development and climate change that transcend national and disciplinary boundaries. The unprecedented global collaboration of experts helps identify gaps and reduce duplication in the areas of **sustainable development and sound environmental management**.

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

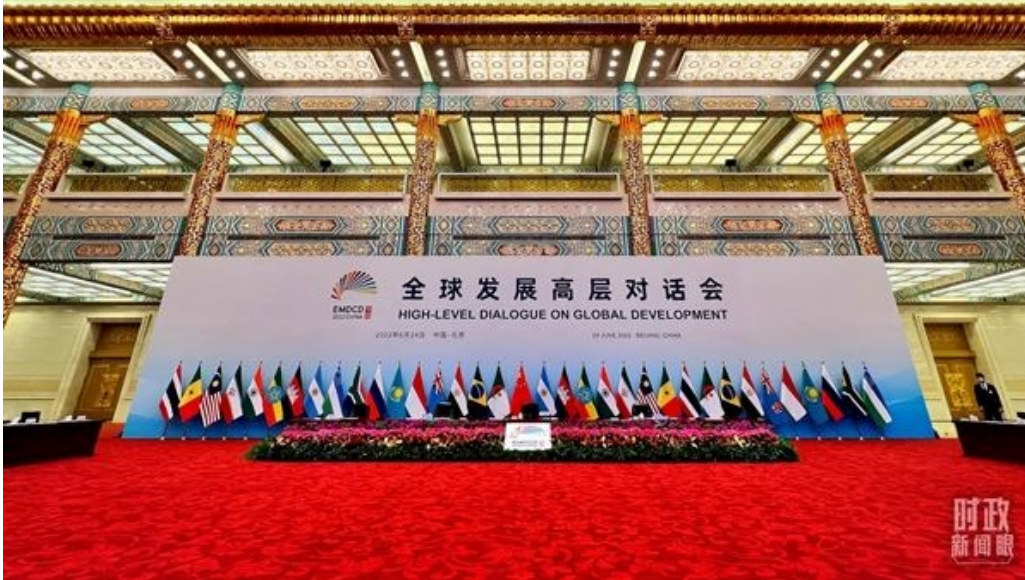
In 2022, work programme "Global Geochemical Observation Network and Digital Chemical Earth" was approved by GEO.

GEO GROUP ON
EARTH OBSERVATIONS



“Chemical Earth” and Global Development

- In 2022, the Big Science Programme of “Chemical Earth” was included in the list of outcomes of the High-level Dialogue on Global Development
- In 2023, the UNESCO Regional Office for East Asia and the Ministry of Natural Resources of the People's Republic of China and jointly launch the Digital "Chemical Earth" for Global Green Development Initiative





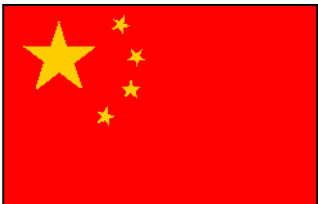
Challenges

- **How to make more progress of the Global Geochemical Baselines Project**
 - **Getting support for “Chemical Earth” Project from overseas governments**
 - **Actively using international platforms- UNESCO, GEO, IUGS, etc to increase the publicity and influence of ICGG**
 - ...
- **How to further strengthen serving the SDGs**
 - **Utilizing new methods such as big data and artificial intelligence to further explore data**
 - **Enhanced cooperation among Category 2 Centers**
 - ...



Second Eight-Year Plan (2023 to 2030)

- ❑ **To strengthen the international cooperation networks** of global-scale geochemistry and continuously foster knowledge and technologies for sustaining natural resources and environments;
- ❑ **To conduct the Global Geochemical Baselines Project** to cover 50% of the earth land surface , prioritizing the “Belt and Road” countries, to record the concentrations, distributions and changes of 76 chemical elements around the world;
- ❑ **To hold more training courses** on global-scale geochemical mapping methods, technologies and provide technical assistance to developing countries;
- ❑ **To develop the internet-based digital Chemical Earth website** for geochemical big data sharing and promote equal access to global-scale geochemical data.



United Nations
Educational, Scientific and
Cultural Organization



UNESCO International
Centre on Global-Scale
Geochemistry



Thanks !

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