Geological data for the Sustainable Development Data Ecosystem

Towards nationally integrated geospatial information management

Dr. Yueqin Zhu, China Geological Survey (CGS)
A. Geological data and the practices for SDGs

B. Successful case studies for integrated geospatial information management

C. Conclusion and suggestions
Object: Crust, Earth (lithosphere)

Mission: Determine the composition, structure and evolution of Earth. To obtain the information about resources and environments for our living

The geological work is a complete process of the data ecosystem.
Geological Works and Data

Field Route Data Collection

Geochemical Exploration

Geophysical Exploration

Sample analysis test

Remote sensing

Geological disaster monitoring

Comprehensive analysis and results report
**Geological Works and Data**

**Spatial**
- Describes the spatial structure and attributes below the surface
- minerals, geophysics, geochemistry, mathematical geology, geomechanics, environment, paleontology

**Reusable**

**Complex**
- Various methods and multi-level acquisition platform
- Long time formation and impact
- Cost highly, and requires long term field working

**Historical**
- Description as reports, videos, images, etc.
Sustainable development practices from Geology

Sustainable resources and energies providing

- Mineral resources: lithium battery (using lithium mine), shale gas, oil, natural gas and clean energy—geothermal
- Groundwater and shallow geothermal energy
Sustainable development practices from Geology

Evidence of resource exploitation、disaster and diseases prevention providing

- Resource and disaster predication: the space-time distribution and the mechanism of forming of material and disaster
- Relationship between subsidence and lung disease caused by resource exploitation and
- Endemic diseases, which is mainly caused by certain soil elements
The occurrence of geological events based on the time of geological bodies formation

Paleogeography, paleoclimate, paleontology, and geochemistry

Quantifying the rise of the Himalaya orogen and implications for the South Asian monsoon
**Sustainable development practices from Geology**

- Provides data from the underground
- Underground space planning
- 3D modeling with digital Twins
Sustainable development practices from Geology

Geopark, Geological Relics and Characteristic Agriculture

National Geopark

Geological Relics

Characteristic Agriculture
International Karst Data Hub

2008-International Research Center on Karst

ISO/TC 319 - Karst

Resources and Environmental Effects of Global Karst Dynamics Systems

World Karst Map (2018)

Karst landscapes

6 major fields
1. carbon cycle
2. karst water
3. karst landscape
4. ecology
5. karst geological disaster

2018-ISO/TC 319 - Karst

United Nations Educational, Scientific and Cultural Organization

Case studies for integrated geospatial information management
International Geochemistry Hub

2016-International Centre on Global-Scale Geochemistry

Case studies for integrated geospatial information management

Baseline of World Geochemistry

Chemical Earth Platform on the website

Develop and standardize methods
Training and international geological survey

International Geological Survey in 27 countries, including 11 in Asia, 10 in Africa, 2 in Oceania and 4 in South America. Many fields were involved in the international geological survey.

More than 1,000 trainees from the world participated in the training course host by CGS. The training topic covers water resources, basic geology, karst, geochemistry, map compilation, and other fields of geology. Much data was got during this communication.
## Case studies for integrated geospatial information management

### A National Geological Big Data Hub

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Case studies for integrated geospatial information management

International Sharing and Service

Internal information sharing by GeoCloud(http://geocloud.cgs.gov.cn/)
Case studies for integrated geospatial information management

Distributed Structure
Case studies for integrated geospatial information management

Framework and Achievements
Conclusion and Suggestions

(From Stefan Schweinfest)
Conclusion and Suggestions

Technology:
Management processing, and description, as well as data integration, expression, simulation, dissemination, interpretation, reuse, and long-term preservation.
AI, Distributed cloud architecture, Blockchain

Policy:
Data Sharing: Incentive and enforcement policies
Intellectual Property: Data publishing
Data Interoperability: Global data model and describe model

Mechanism: Working Group
A Geological Big Data Working Group:

➢ To provide a general geological information framework and platform

➢ To play a leading role at the national level by raising political awareness and highlighting the importance of geological big data with the features including reliable, timely and fit-for-purpose, to play an important role for geological big data in decision making processes, to improve the integration of geological data and the global fundamental geospatial data.
➢ To strengthen national capacity for geological survey and geodata processing to stimulate green development and digital economy.

➢ To share or exchange the experience among all member states for some crucial global problems, which may have potential solutions from geological big data to support 2030 SDG.
Conclusion and Suggestions

Surface and underground
Integration of the Geography geospatial data and Geological data

Geography
Geographic spatial data

Geology
Geological spatial data

Digital of our world
Geospatial data of earth
Conclusion and Suggestions

Geological Data is of importance and Cannot be Separate from the process of sustainable development, and it requires participation from everyone that lives on the same planet earth.

Thanks for your listening
谢谢！