The Main Mineral Resources Potential Assessment in China

CHINA GEOLOGICAL SURVEY

October 2011

1. Target and task

- Assess the potential of 25 commodities as: coal, uranium, iron, bauxite, copper, lead, zinc, gold, tungsten, tin, rare earth, solvate, phosphorus, manganese, nickel, antimony, chlorite, molybdenum, silver, boron, lithium, sulfur, fluorite, baudisserite, and barite.
- For targeting the exploration prosperous areas, assessing the potential value, and serving the planning of national mineral exploration and exploitation.

2. Technical scheme

- Fully using the 1/50-1/250 thousand scale information, and all kinds of mineral exploration information.
- Application of the theory of continental dynamics, deeply developing the collected information to study the geological construction.
- Application metallogenic theory, systematically study some typical deposits and mineralized regulation to define the geological factors.
- Roundly utilizing the gravity, magnetic, geochemical, remote-sensing, and heavy concentrate information to interpret the metallogenic symbols.
- Entirely utilizing the GIS computer techniques to found the whole spatial data system.
- Constructing a synthesized information potential theory and method to target the prosperous areas, and to assess the resources potential.

1-1. Fully using all kinds of the 60 years' geological information

- The information of mineral investigation, prospecting, general exploration, exploration, and the study achievement of regional metallogeny.
- The information 1/50-1/250 thousand scale regional investigation.
- The information of 1/50-1/250 thousand scale regional gravity, magnetic, geochemical, remote sensing, and heavy concentrate.
- Some basic scientific research information related to mineral deposit.

Regional and local evaluation （Scale-free limit）

- According to data accuracy
- Mid-scale data applications, evaluation of regional mineral resources potential.
- Large-scale data applications, evalution of mineral resources prediction

1-2. Application of the theory of continental dynamics, deeply developing the collected information to study the geological construction

- Us of regional geological survey raw data, analyzing and mapping lithology and lithofacies, studying discrete, convergence, collision and orogenic processes of the continental crustal blocks, determine the geological structure background.
- **Workflow:** Actual material map – lithologiy map – structure construction map – tectonic phase map

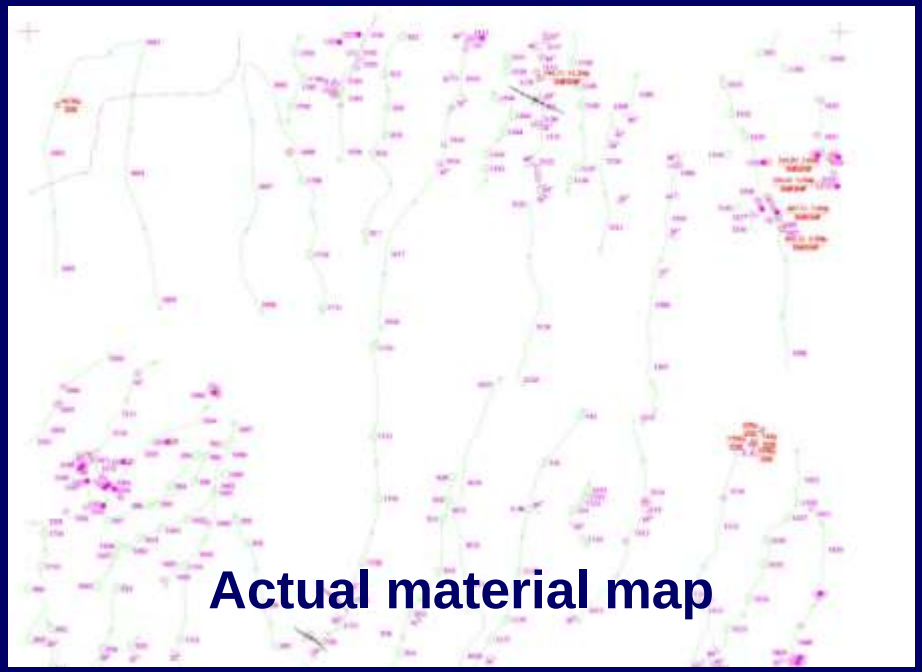
Regional tectonics

- Actual material map (1:250000)
- structure construction map (1:250000)
- tectonic phase map (1:500000)

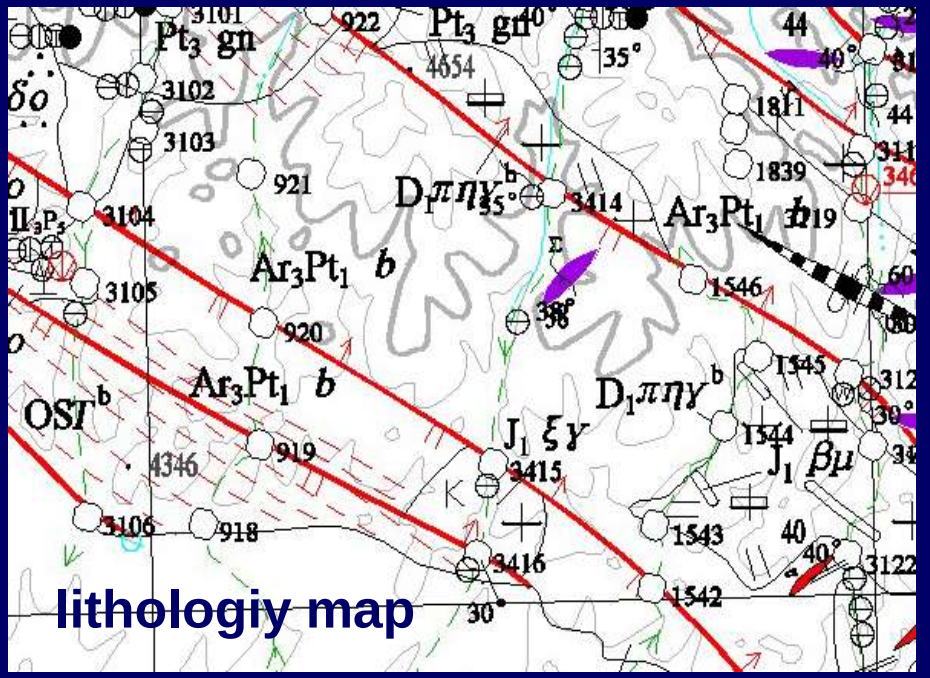
Geological structure for mineral resources assessment

(≥1:5000 – 1:250000)

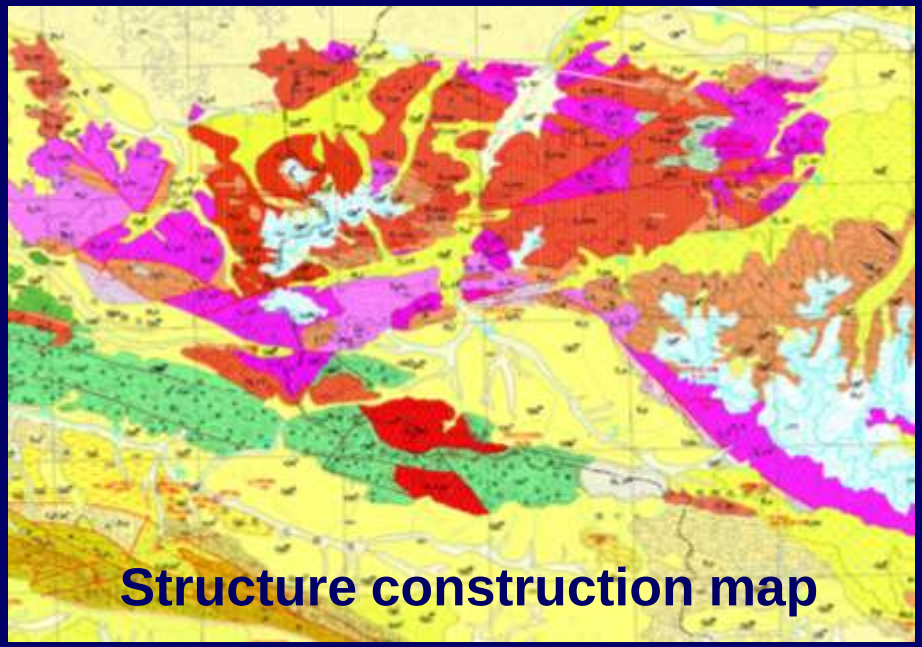
- ***Sedimentary type:*** Tectonic paleography/ Sedimentary paleo-tectonic/ Geomorphology and Quaternary
- ***Intrustive rock type:*** Intrusive igneous structure
- ***Volcanic type:*** Lithological facies volcanic structure
- ***Metamorphic rock type:*** Constructural of structural deterioration
- ***Stratabound endogenous type:***
- ***Synthesis causes type:*** *T*ectonic phase



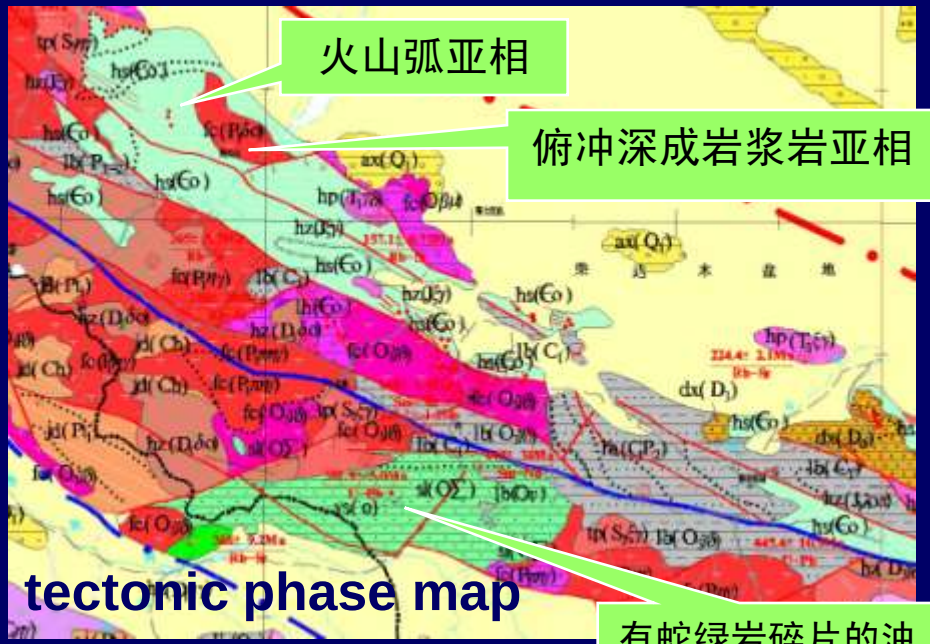
Actual material map



lithologiy map



Structure construction map

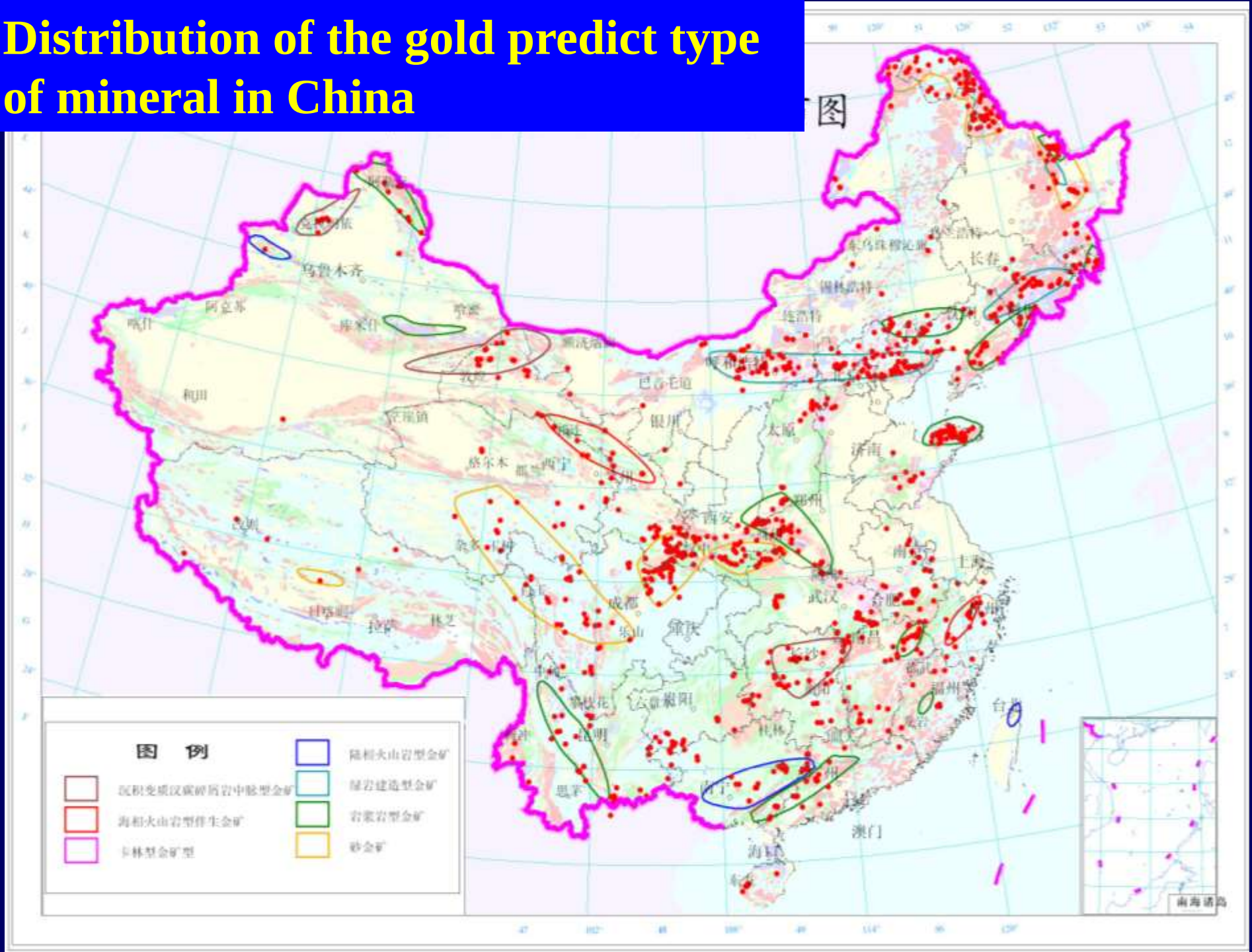


tectonic phase map

1-3. Application metallogenic theory, systematically study some typical deposits and mineralized regulation to define the geological factors

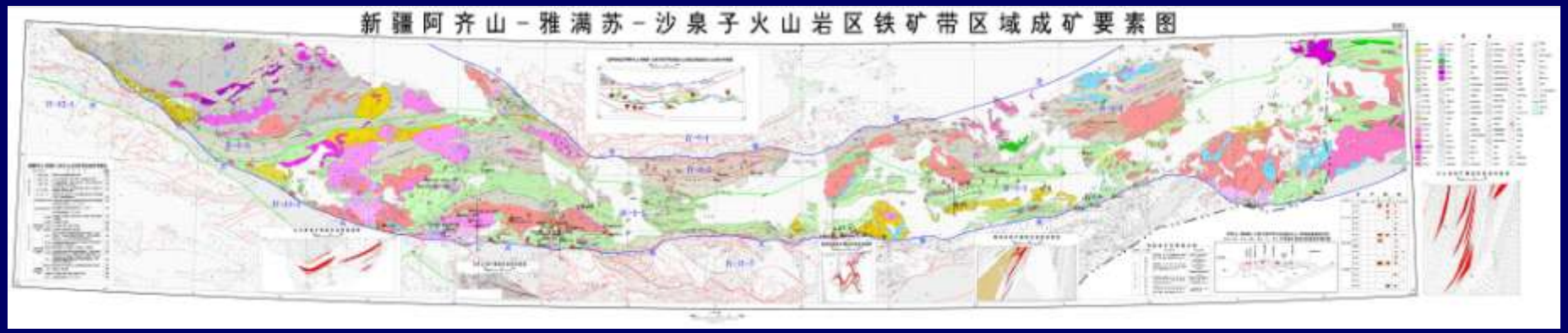
- Divided the predict type of mineral
- The same geological age, the same mineralization and the same genetic type of a group of minerals
- According to the predict type of mineral , systematically study some typical deposits and mineralized regulation to define the geological factors

Distribution of the gold predict type of mineral in China



- **Utilizing the large-scale data of gravity, magnetic, geochemical, remote-sensing and so on, studied the typical deposits**
  - **Mineralization age**
  - **Tectonic setting**
  - **Geological features of mineralization**
  - **Structural features of mineralization**
  - **Mineral characteristics**
  - **Mineralization**
  - **Geological, geophysical and geochemical model of the deposit**
- **Established metallogenic model**

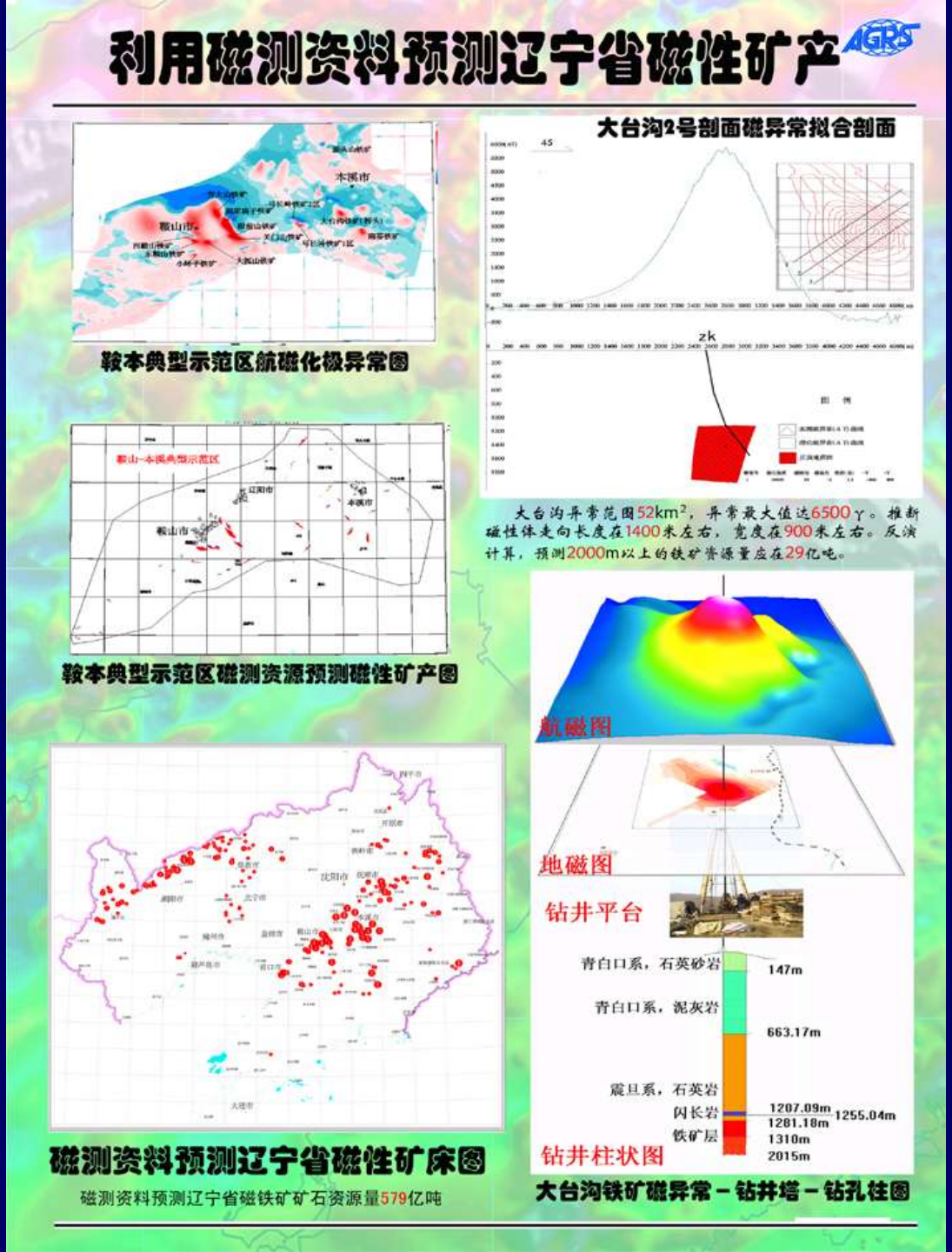
- **Simmary of the law of the regional metallogenic**
- **Established the regional metallogenic**



1-4. Roundly utilizing the gravity, magnetic, geochemical, remote-sensing, and heavy concentrate information to interpret the metallogenic symbols

- Base on the difference between the physical properties, element geochemistry and image of ore
- Interpreting the data of gravity, magnetic, geochemical and remote sensing for regional tectonic setting and mineral ore

- Using the dimensional and sectional magnetic information to locate the magnetic mineral body, and to assess the reserves.
- Using the geochemical information to assess the reserves.



1-5. Delineated exploration prospect areas by Intergrated information

- Applying geological, geophysical, geochemical and remote sensing information to delineate mineral exploration prospect areas by computer systems of MRAS
- Optimization and sorting the prospect areas by method of weight of evidence and characteristics and so on.

1-6. Estimate the amount of mineral resources by many methods

- **Methods: geological volume method, general information, analogy and so on**
- **Result: Mineral resources divided by the depth, accuracy, reliability and availability**
  - **Depth: 0-500m, 0-1000m, 0-2000m**
  - **Accuracy: 334-1、334-2、334-3**
  - **Reliability: confidence interval estimation**
  - **Availability: available, temporarily not available**

1-7. Entirely utilizing the GIS computer techniques to found the whole spatial data system

- The database of geological settings, metallogenic regularities, gravity, magnetic, geochemical, remote sensing, heavy concrete.
- Supply the electronic information for the management, protection, utilization, programming, and deployment of national mineral resources.

3. Forms of organization

- Overall by the Nation, Region and Province
- National level: Summary group responsible for developing technical standards and technical requirements, training and guidance the Regional and provincial groups.
- Rgional level: Set up the groups of Huabei, Dongbei, Huadong, Zhongnan, Xinan and Xibei that training and guidance the provincial groups.
- Provincial level: Set up provincial groups that responsible for the province’s work.

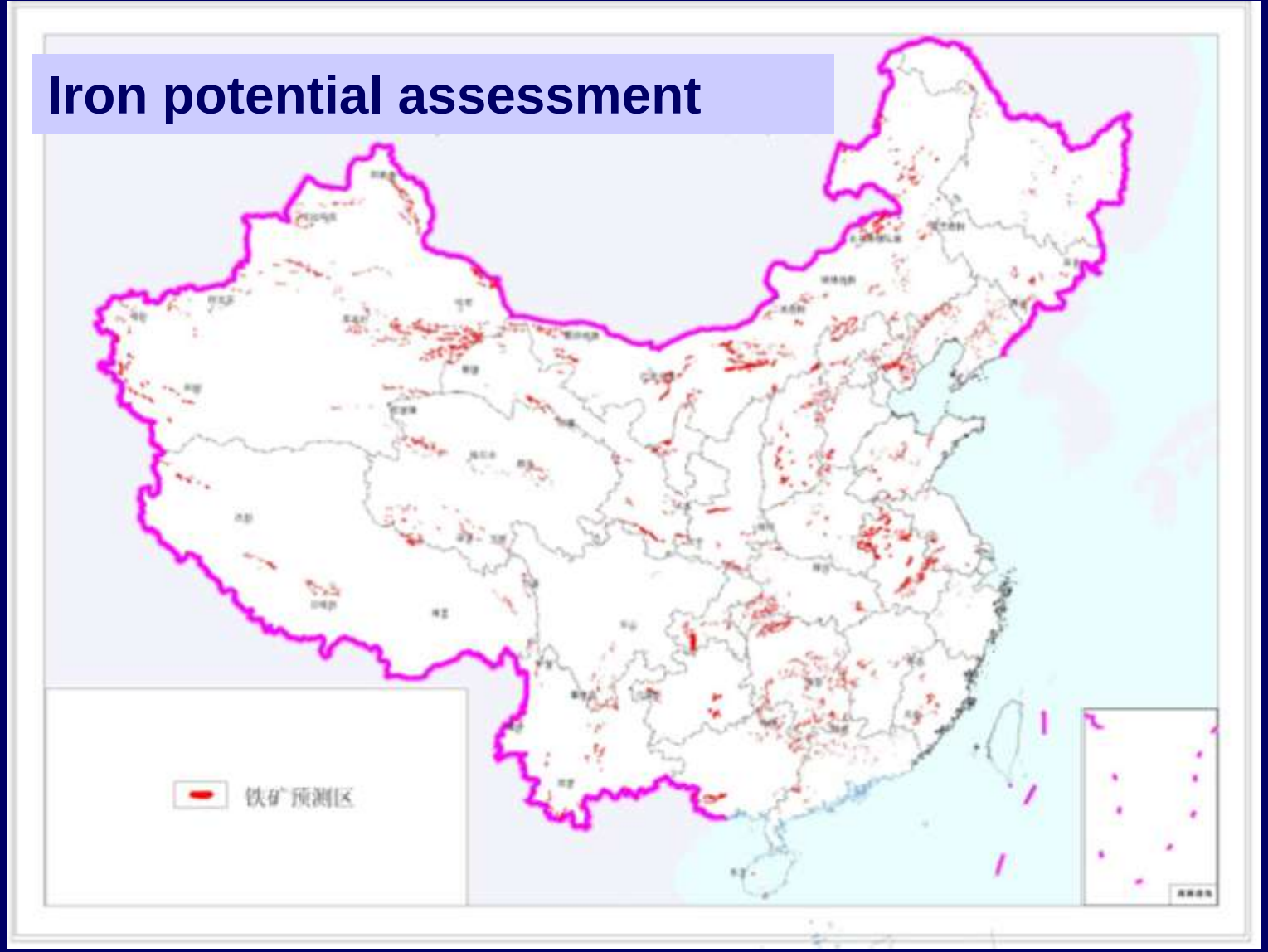
Five standard requirements

- Unified organization
- Unified idea and method
- Uniform requirements
- Uniform standards
- Uniform progress

4. Progress and achievement

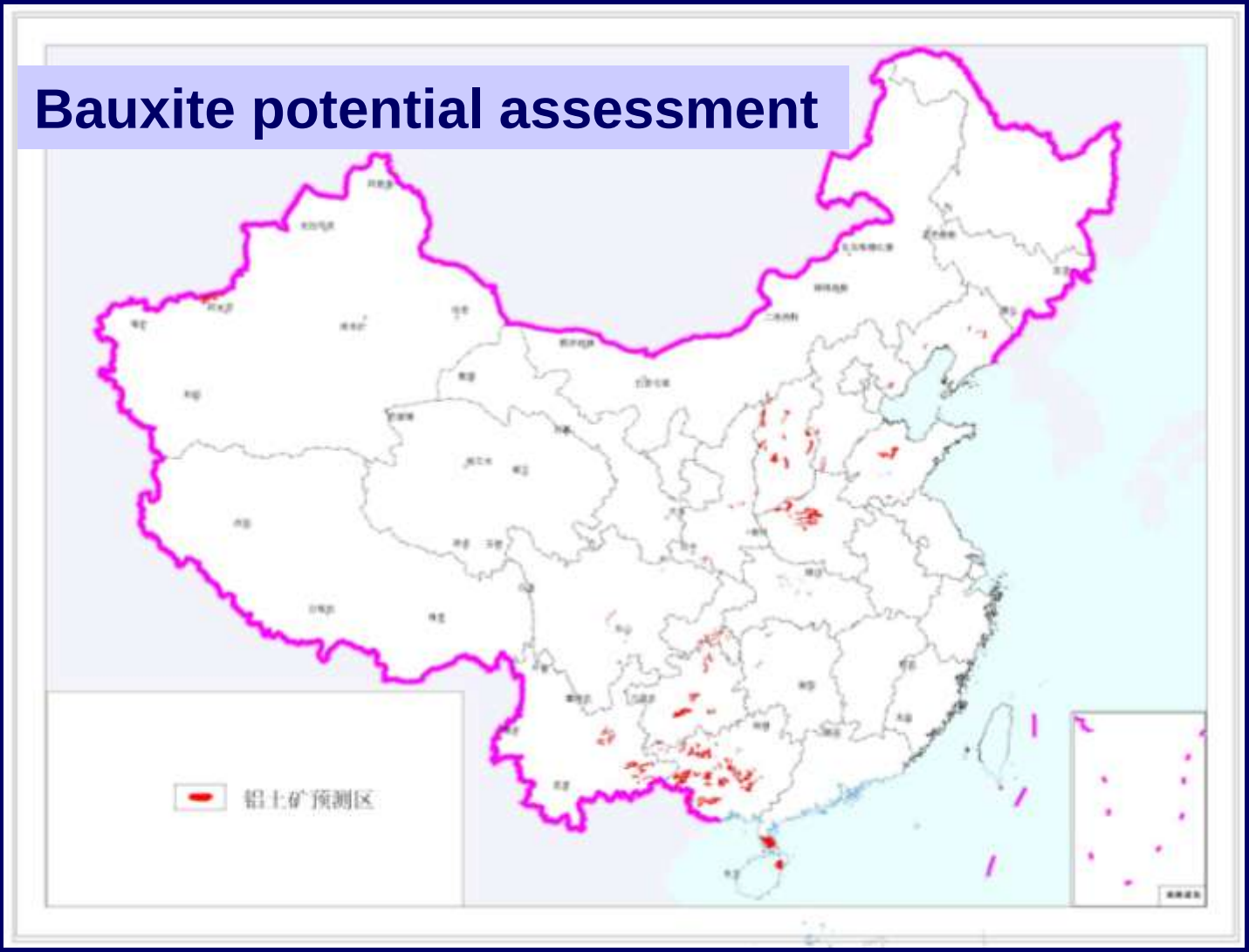
- Finished the development and utilization of informational construction, gravity, magnetic, geochemical, remote sensing, heavy concrete with the scale of 1:200 – 1:250 thousand, and other scales.
- Finished the potential assessment of 13 commodities: iron, bauxite, copper, gold, lead, zinc, tungsten, antimony, rare earth, solvate, phosphorus, coal, uranium, and also targeted the prosperous areas.

Iron potential assessment



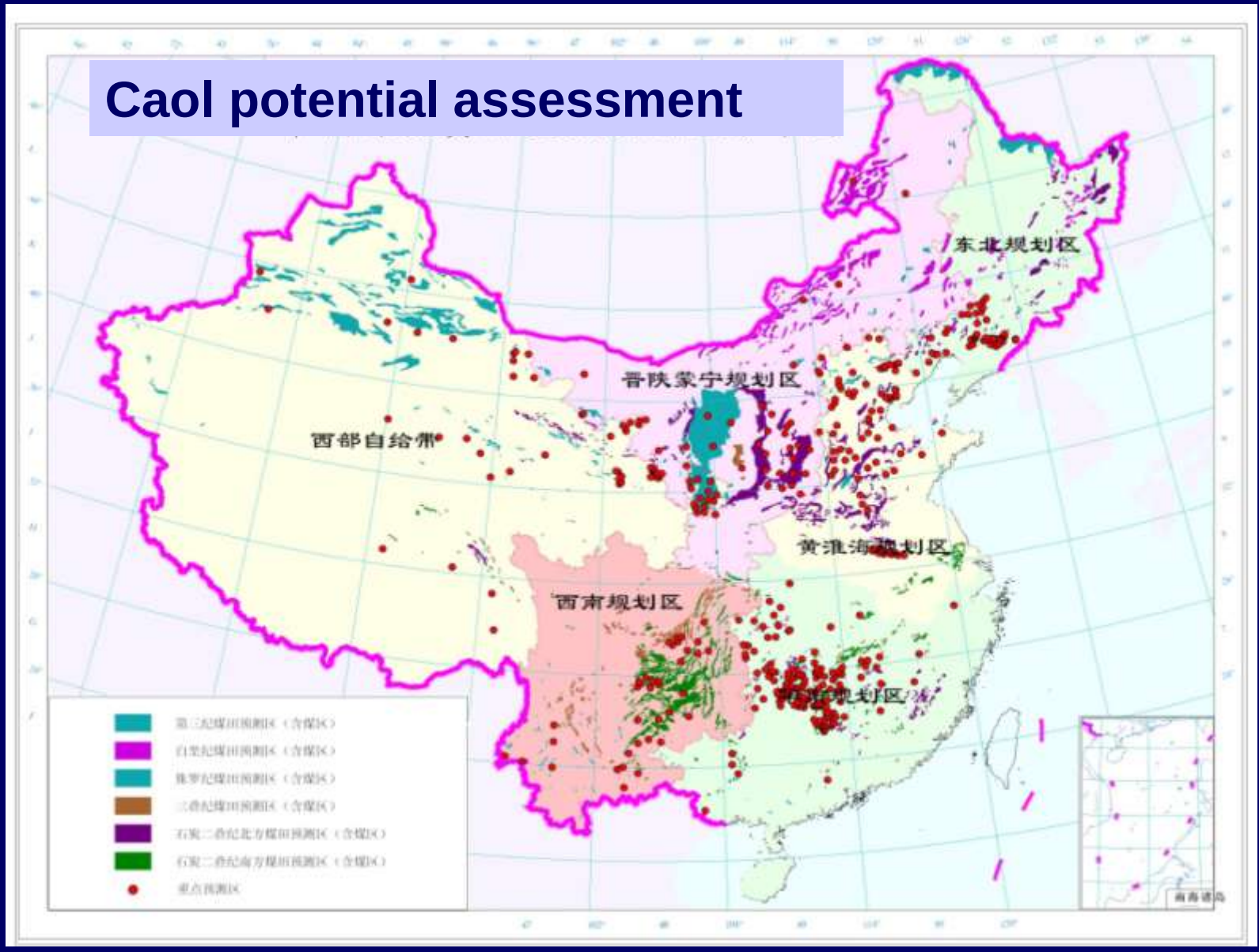
- 393 iron prosperous areas, the potential reserves are 2.7 folds than the proven
- 76 prosperous areas over 0.5 billion tons, 44 prosperous areas over 1 billion tons, 8prosperous areas over 5 billion tons, and 2 prosperous areas over 10 billion tons
- Mainly distributed in Anshan-Benxi in Liaoning province, East Hebei, Panzhihua in Sichuan, West Shandong, South west Fujian, Wuyang-Xincai in Henan, Longzong in Anhui, Tianshan in Xinjiang.

Bauxite potential assessment



- 101 bauxite prosperous areas, the potential reserves are 4.2 folds than proven
- 75 prosperous areas over 10 million tons, 33 prosperous areas over 100 million tons, 7 prosperous areas over 0.5 billion tons, and 2 prosperous areas over 1 billion tons
- Mainly distributed in Shanxi, Henan, Guizhou, and Guangxi.

Caol potential assessment

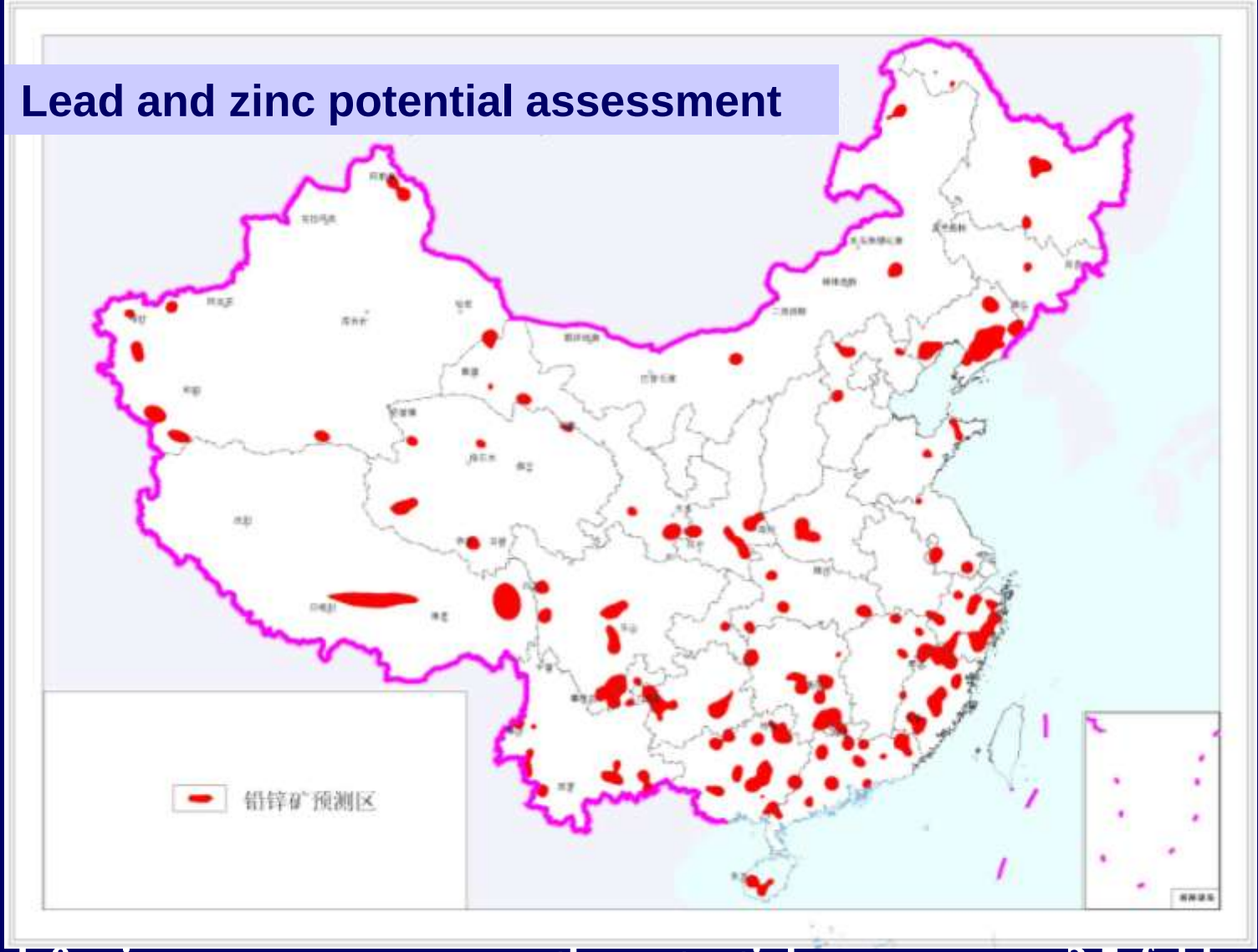


- 2947 coal prosperous areas, the potential reserves are 3 folds than the proven
- Mainly distributed in West and the deep part of East China.

Copper potential assessment

- 372 copper prosperous areas, the potential reserves are 3 folds than the proven
- Mainly distributed in Tibet, Southwest of Sanjiang, Xinjiang and some old mines in East China

Lead and zinc potential assessment



- 97 lead & zinc prosperous areas, the potential reserves are 3.5 folds than the proven
- Mainly distributed in Northeast China, Hunan, Guangdong- Guangxi, Yuan-Sichuan, Northwest China

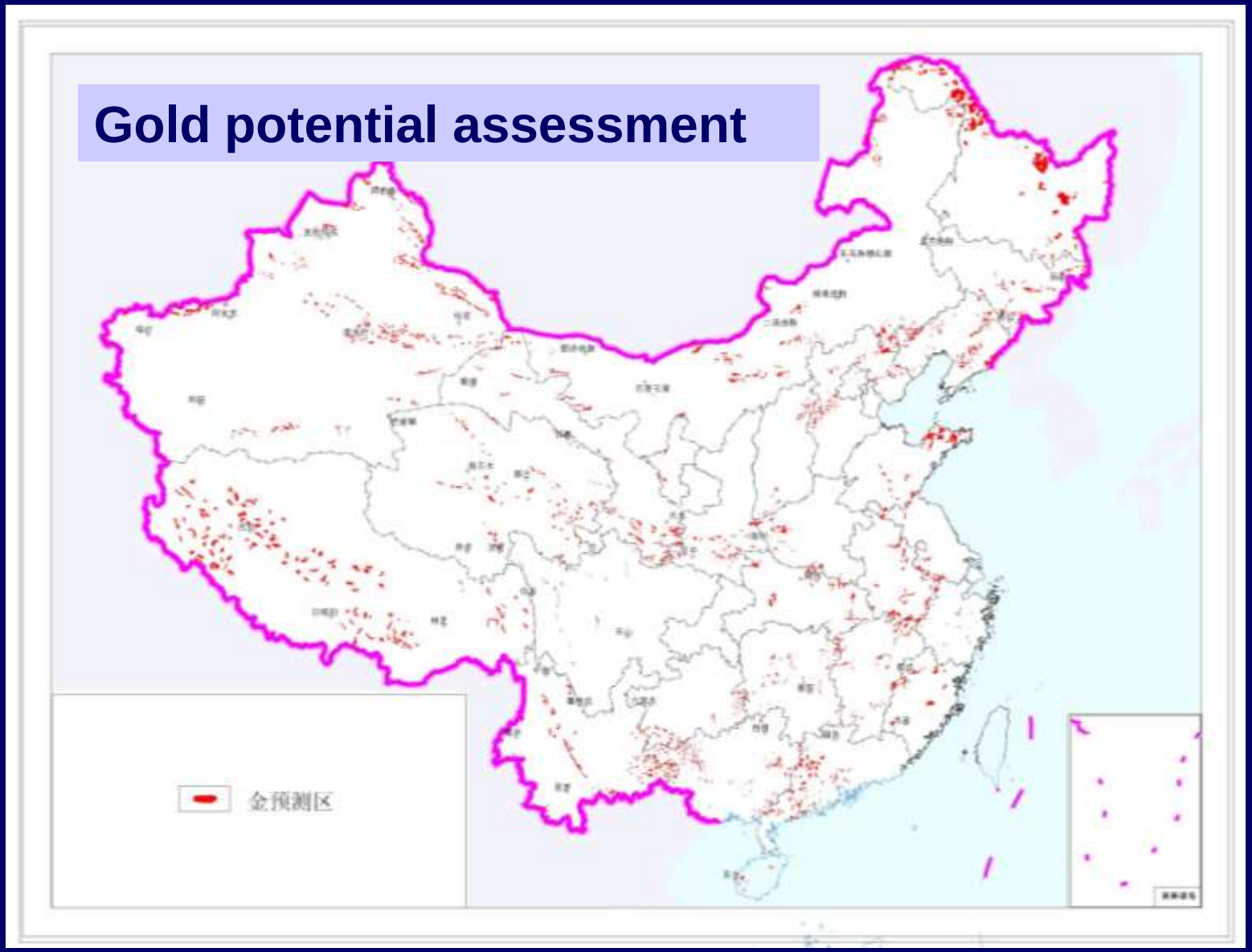
Tungsten potential assessment

- 118 tungsten prosperous areas, the potential reserves are 2.4 folds than the proven
- Mainly distributed in Jiangxi, Hunan, Guangdong, Fujian

Antimony potential assessment

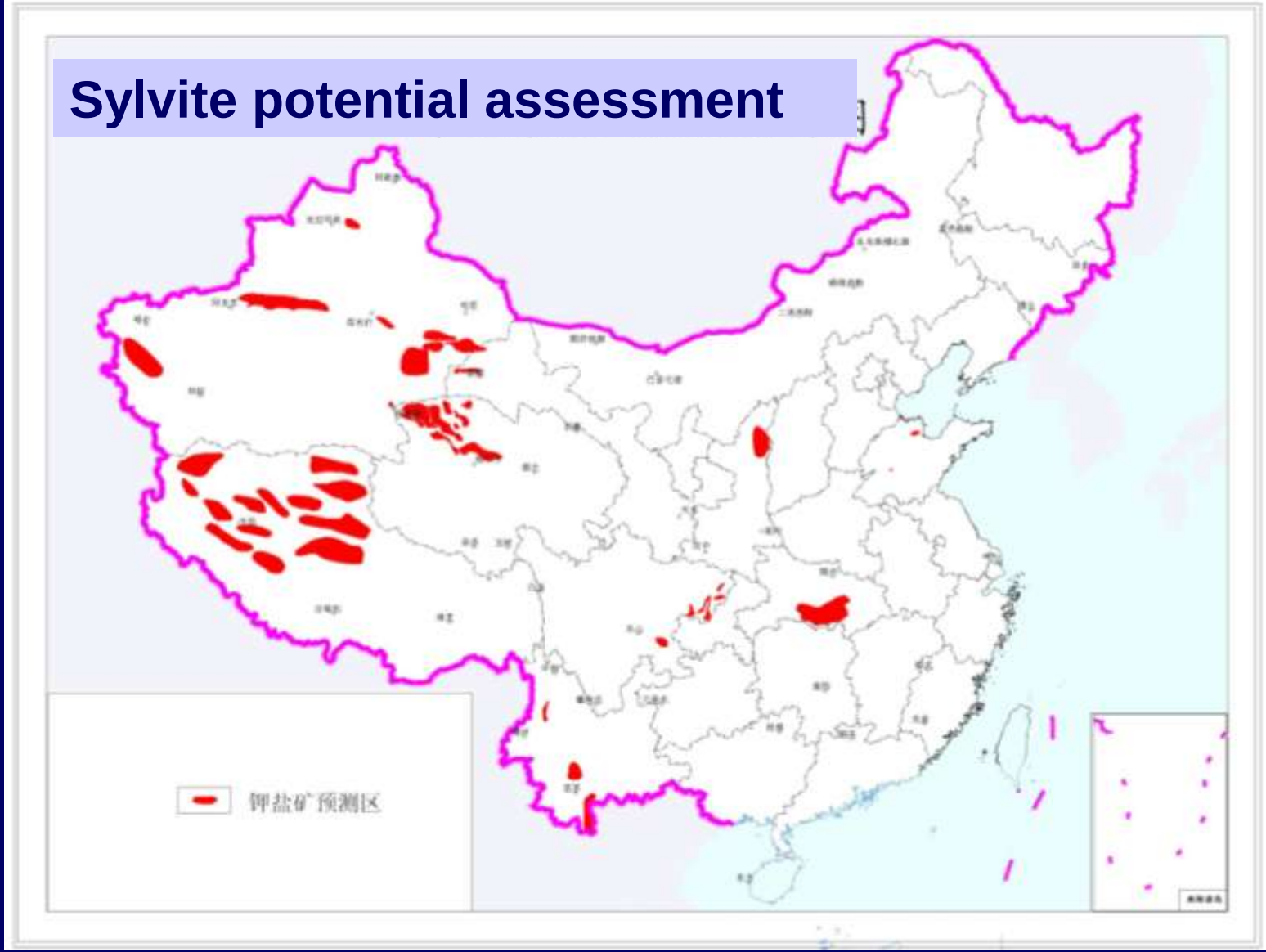
- 154 antimony prosperous areas, the potential reserves are 7 folds than the proven
- Mainly distributed in the Middle Hunan, South Hunan, North Guangdong, and Northeast Guangxi

Gold potential assessment



- 366 gold prosperous areas, the potential reserves are 3.5 folds than the proven
- Mainly distributed in the deep and periphery part of some old mines

Sylvite potential assessment



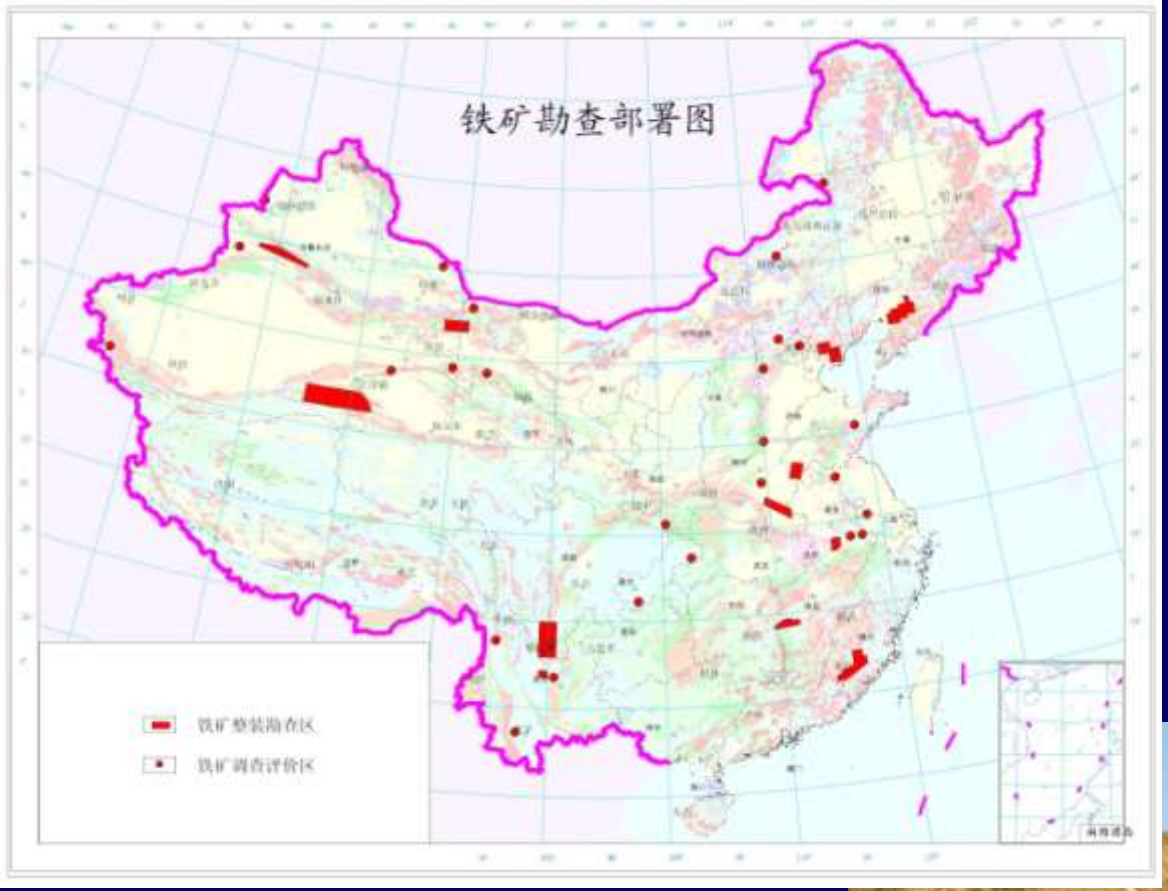
- 12 sylvite prosperous areas, the potential reserves are 2.4 folds than the proven
- Mainly distributed in Luobupo, Kuche, and Shache in Xinjiang, North Tibet, Sichuan basin, Lanping-Simao basin, Ordos, West Chaidamu Basin

Phosphorite potential assessment

- 12 phosphorite prosperous areas, the potential reserves are 1.9 folds than the proven
- Mainly distributed in Southwest Sichuan-Northeast Yunan, Dianchi-Fuxianhu in Yunnan, Shennongjia-Yichang in Hubei, Dongkaifeng in Hunan, Kaiyang-Wengan in Guizhou

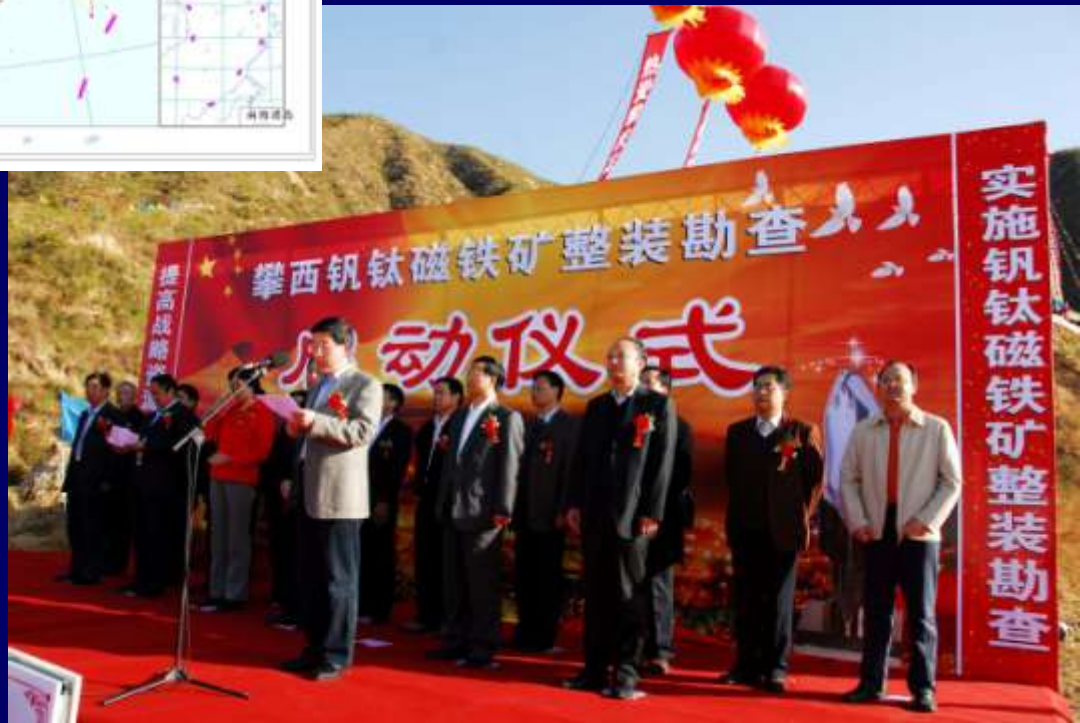
- **The achievements have already been quoted by some important mineral resources layouts and deployments.**

Provide some new targets for prospecting



National iron survey deployment map was based on the iron potential results

The Panzhihua potential area is now a important prospecting area



Introduction

- It is one of the most important project launched by Ministry of Land and Resources of China From 2006 to 2012.
- About 30 provinces, 165 geological teams or organizations, and 3700 geological engineers are joined in the work.
- Until the end of 2011, the total invest of the Project is 1.25 billion Yuan(including the central finance 0.7 billion, and the local finance 0.55)

- **The assessment of left 12 commodities, manganese, nickel, antimony, chlorite, molybdenum, silver, boron, lithium, sulfur, fluorite, baudisserite, and barite, is now under way, will be finished in 2012.**

THANKS FOR YOUR ATTENTION!