Regional/National Geochemical Mapping in China

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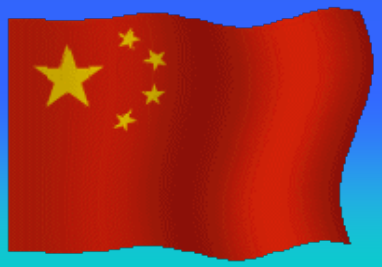

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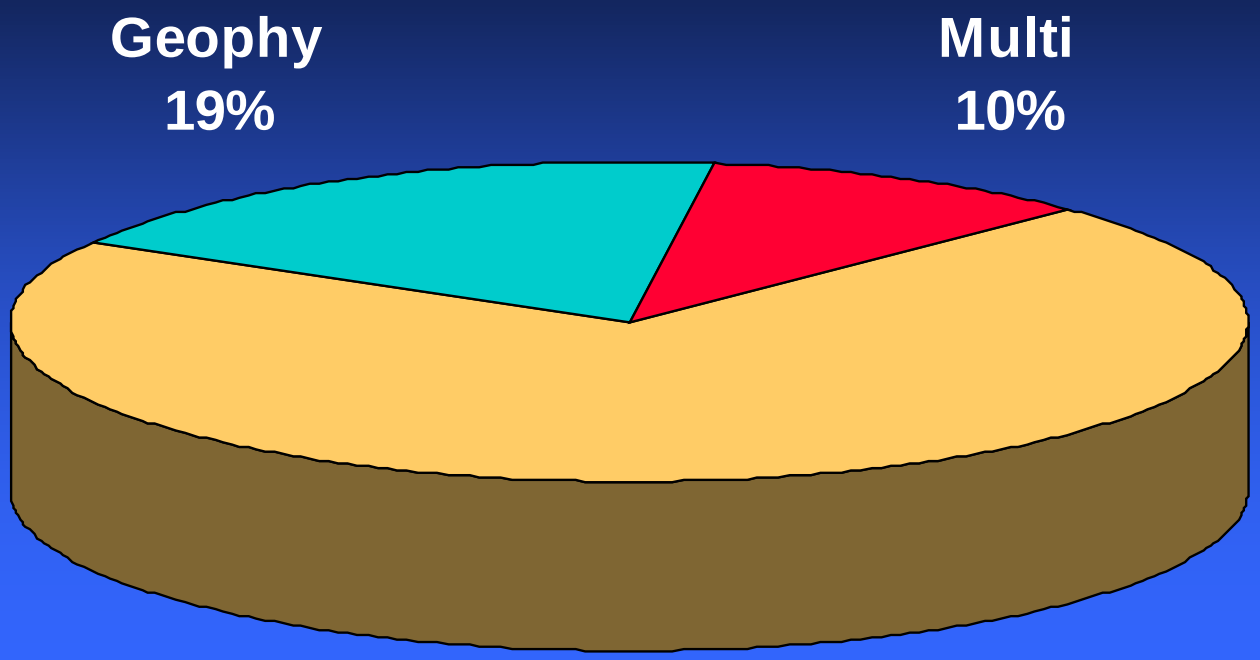
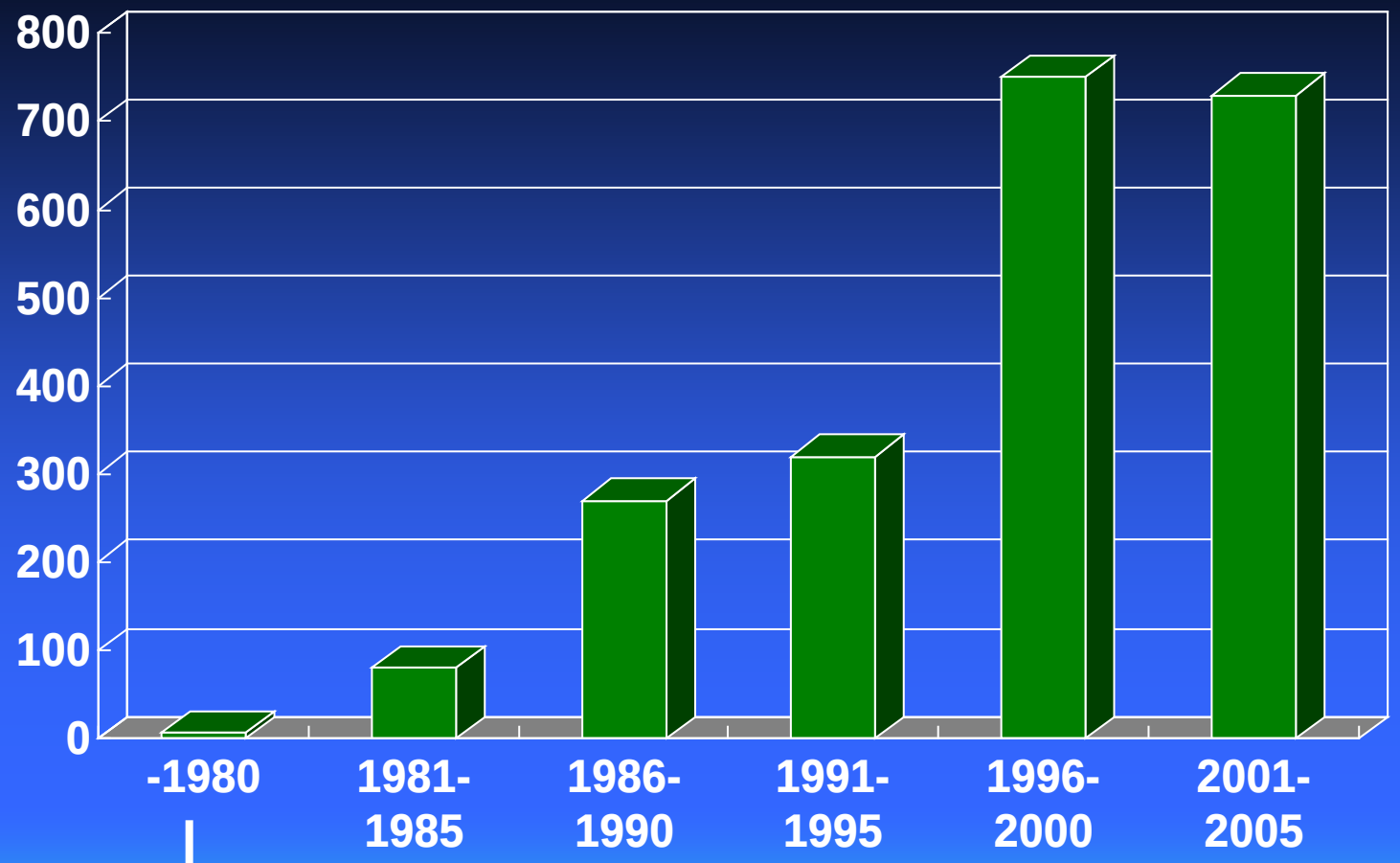
Geochemical mapping has made a great contribution to mineral discoveries in China

Proportion of 817 New Deposits discovered by different methods in China 1981-2000

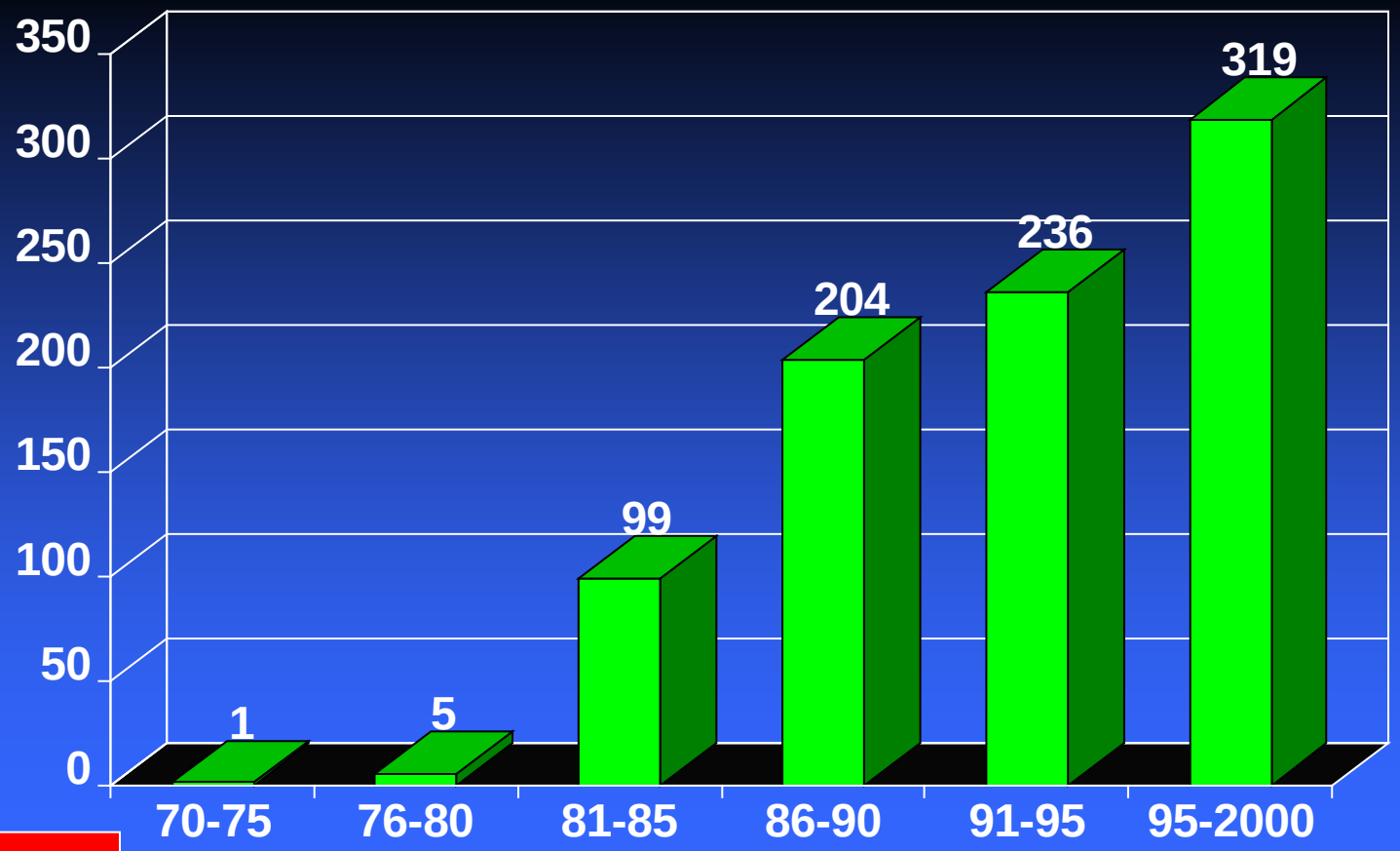


Number of ore deposits discovered by geochemical surveys by years



National Geochemical Mapping Projects

Number of gold deposits by geochemical methods by years



National geochemical mapping since 1978
The RGNR project

China Nation-wide Projects for Regional Geochemical Mapping

- Regional/national-scale geochemical mapping
  - **Regional Geochemistry – National Reconnaissance Project, RGNR project, 1978-**
  - Multipurpose Environmental Geochemical Mapping, 1999-
  - Geochemical survey in remote covered terrains, 1999-

- **provided high-quality data and delineation of numerous anomalies for mineral resources.**

Regional Geochemical Mapping

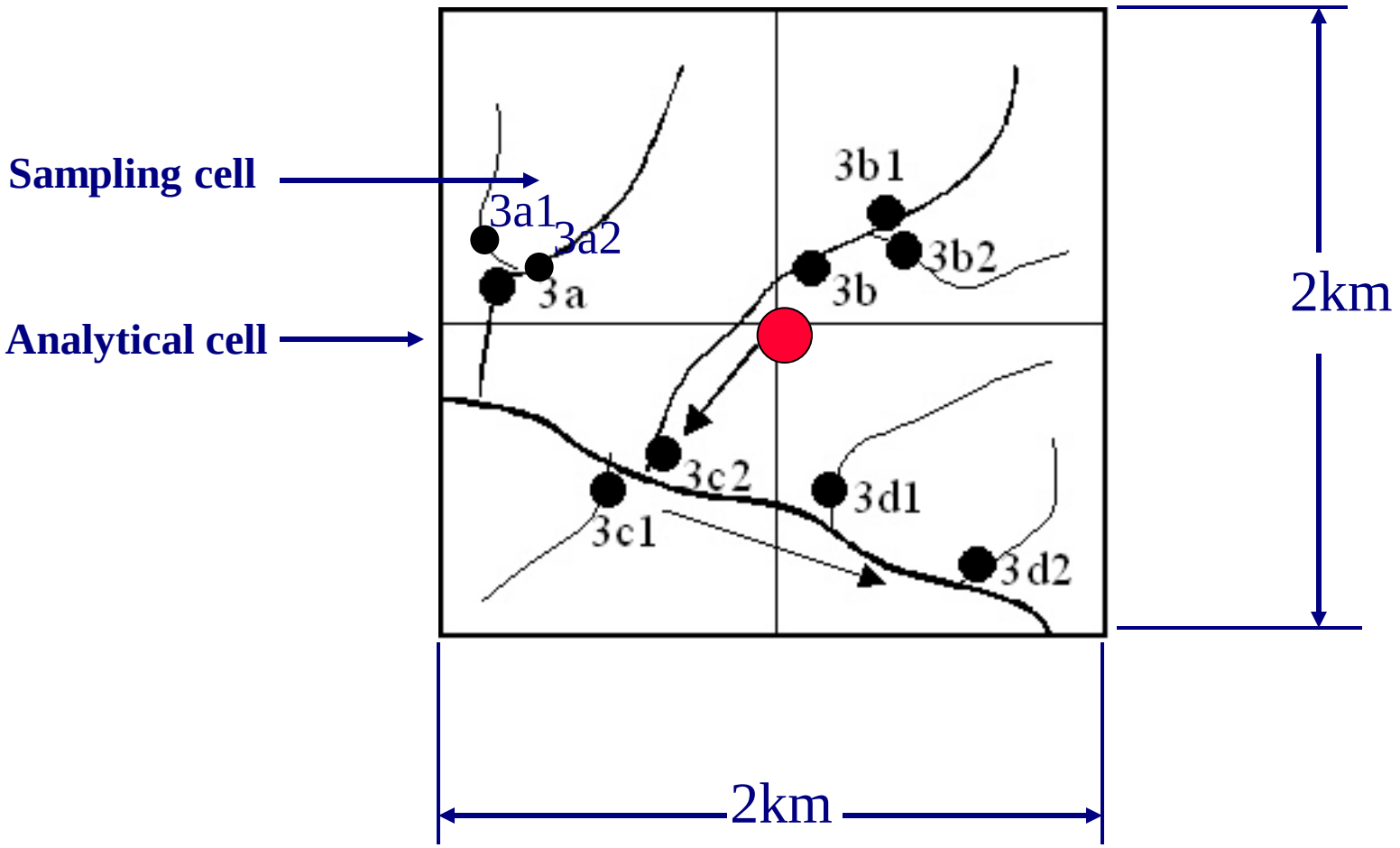
- REGIONAL GEOCHEMISTRY-NATIONAL RECONNAISSANCE PROJECT (RGNR Project)
  - 1978-
  - To find mineral deposits
  - Stream sediments
  - Sampling cell: 1/km^2,
  - Analytical cell: 1/4km^2
  - 39 elements
  - Geochemical maps at 1: 200 000 scale
  - Mountainous and hilly terrains-outcropping/exposed
  - Area covered: -6 million km^2

Procedure for Geochemical Mapping

- Field Sampling
- Laboratory Analysis
- Map Production
- Data interpretation

Development of Sampling Methods

Regional sampling layout of stream sediments in China



Analytical Methods for 39 elements in the RGNR project

Methods	No.	Elements
XRF	12	Si, Al, Fe, K, Ti, P, Zr, Y, Nb, Pb, Cr, Th
ICP-AES	14	Ca, Mg, Na, Mn, Ba, Sr, La, Zn, Cu, Co, Ni, V, Li, Be
ES	3	B, Sn, Ag
GF-AAS	1	Cd
GF-AAS or C-ES	1	Au
HG-AFS	4	As, Sb, Bi, Hg
LF	1	U
ISE	1	F
POL	2	W, Mo
	39 elements	

Analytical systems in China

1979-1982

ORDINARY GRATING SPECTROGRAPHY
AAS, GFAAS
HGAAS, POL
COL, ISE

→

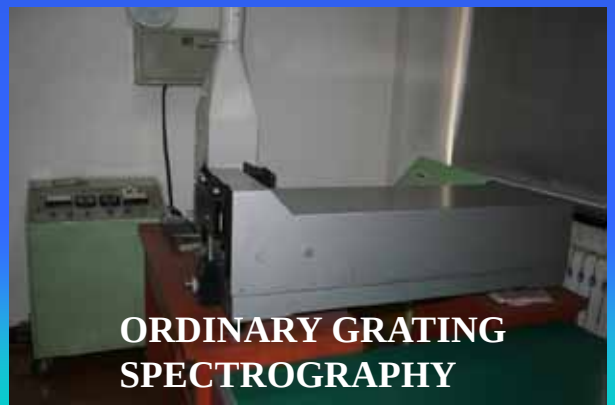
1982-1999

XRF & ICP-ES AS BACKBONE
AAS, GFAAS
HGAAS, POL
COL, ISE

→

1999-PRESENT

ICP-MS & XRF AS BACKBONE
AAS, GFAAS
ES, AF, POL, COL
ISE, LF



Preparation of reference samples

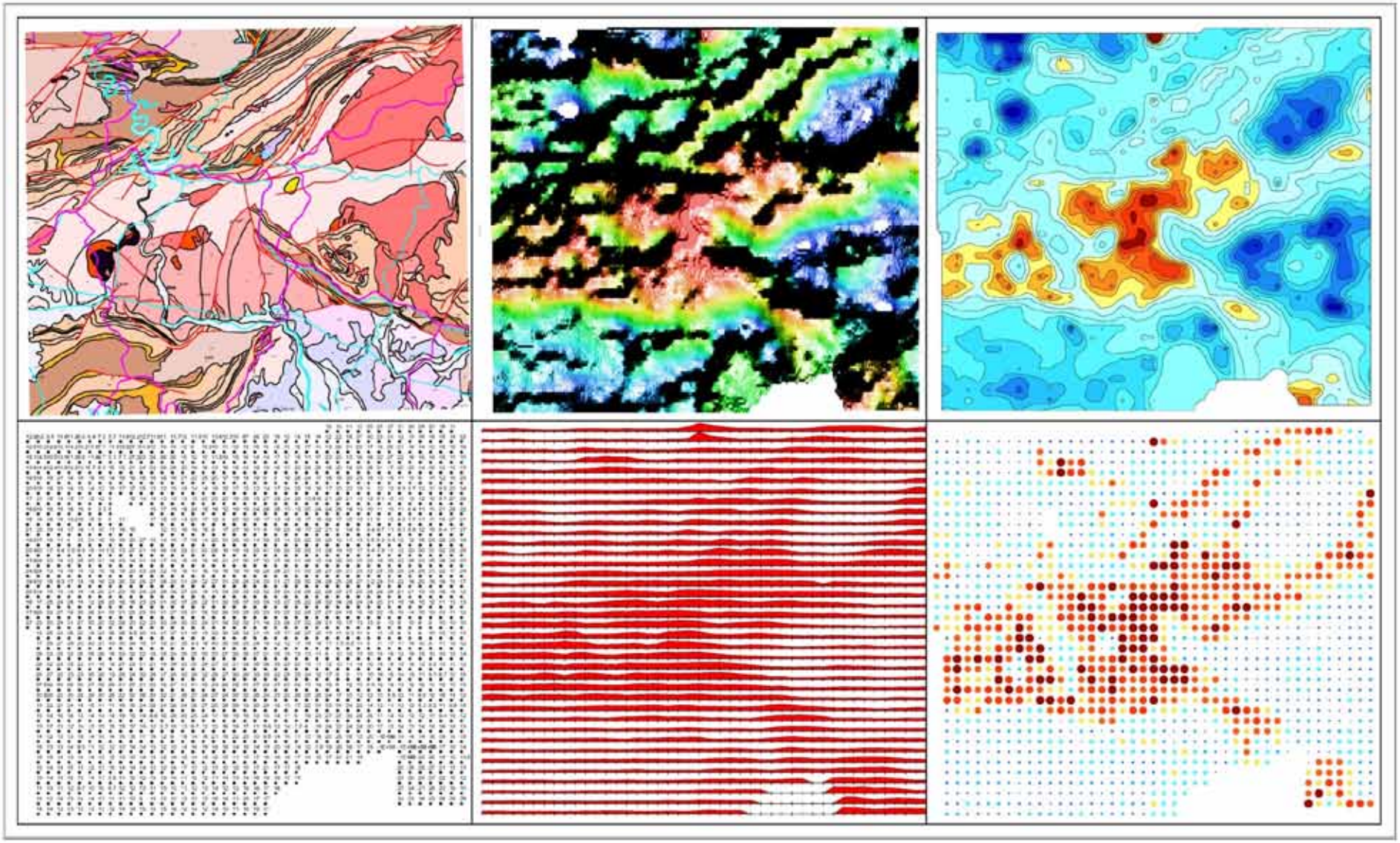
for analytical quality control to obtain comparable Data

Standard Reference Samples

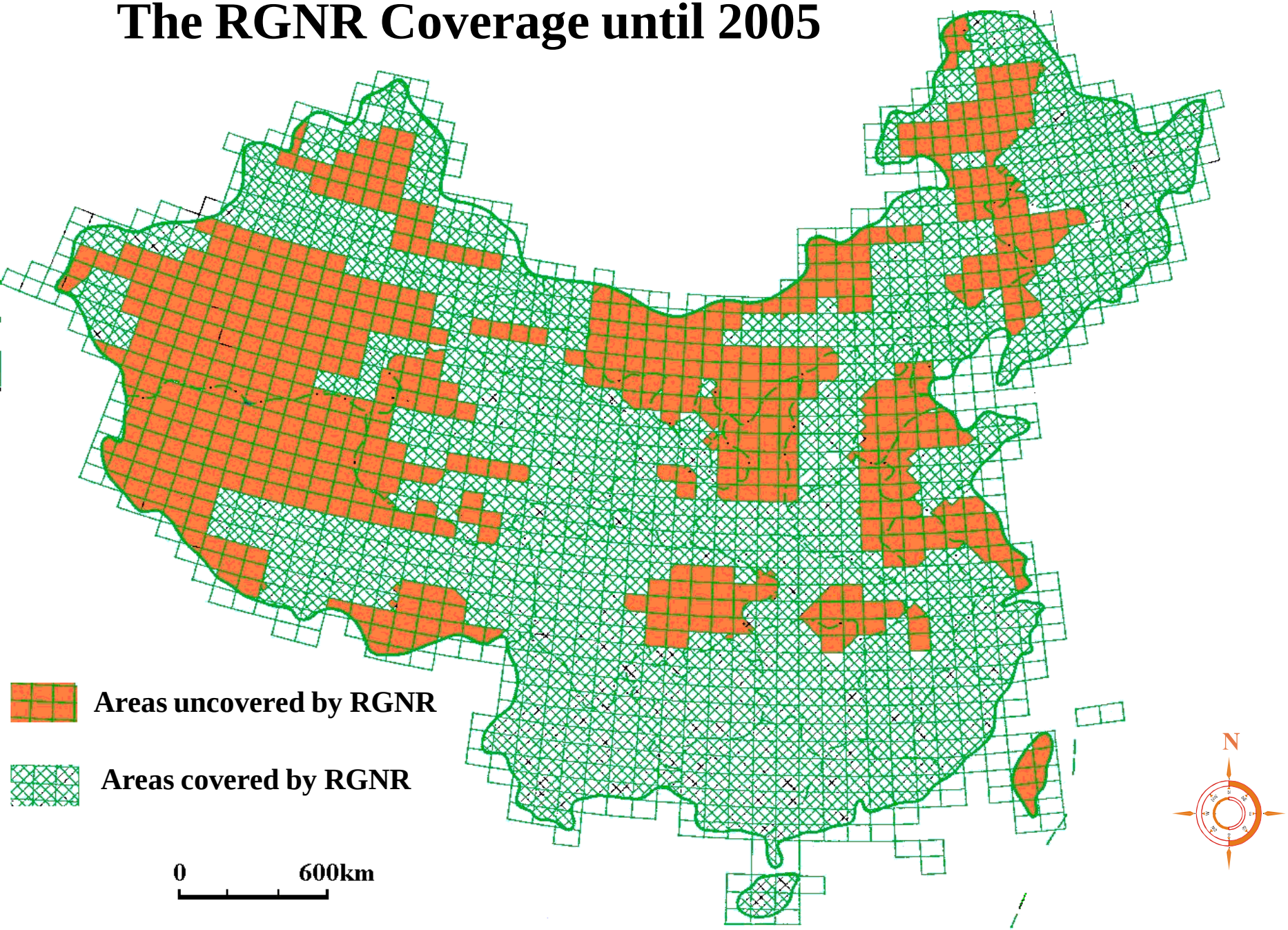
GSD 1-8, stream sediments, 52 elements, 1982
GSD 9-12, stream sediments, 72 elements, 1983
GSS 1-8, soils, 72 elements, 1983
GSR 1-6, rocks, 72 elements, 1983

Geochemical software

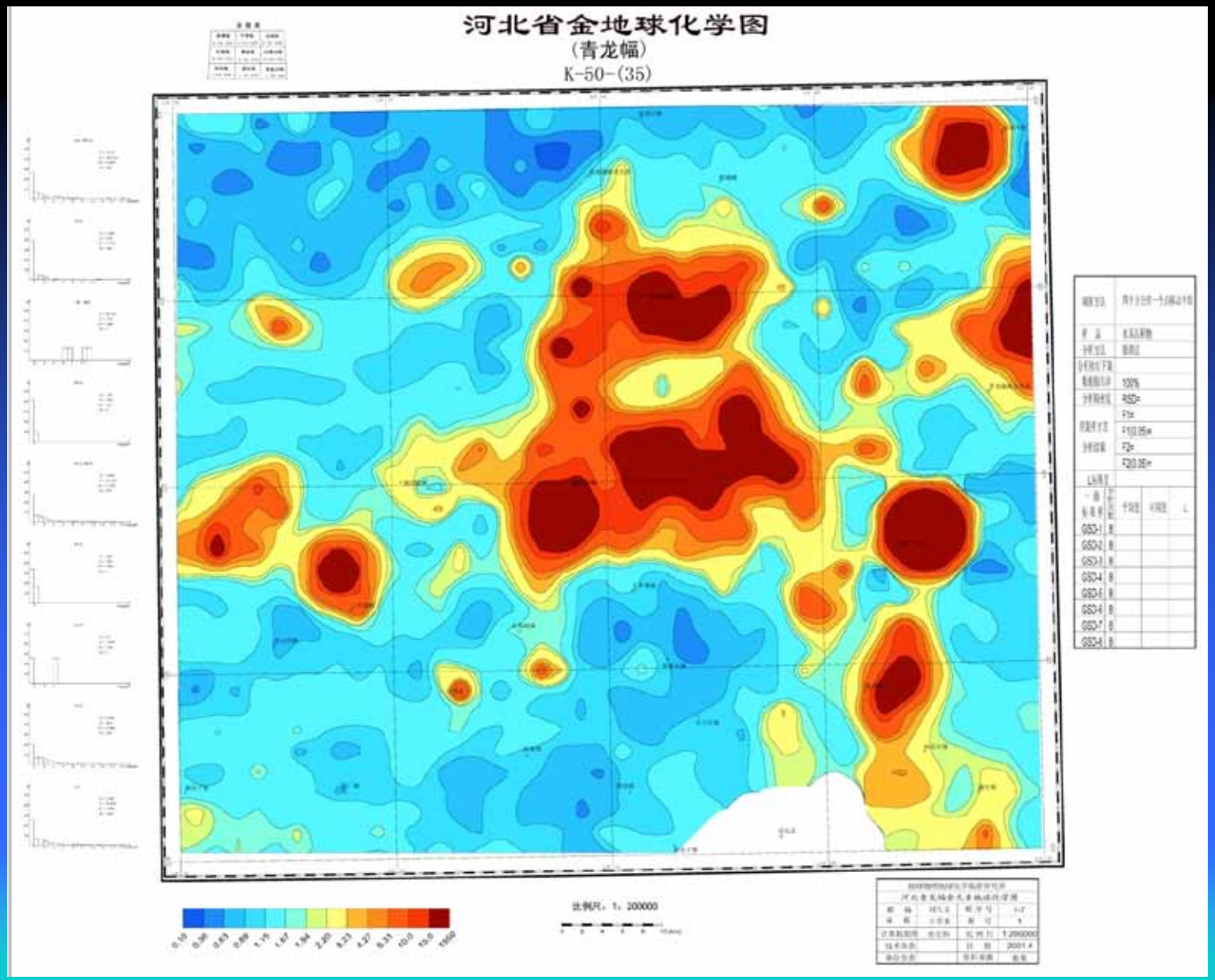
Data Interpretation Maps

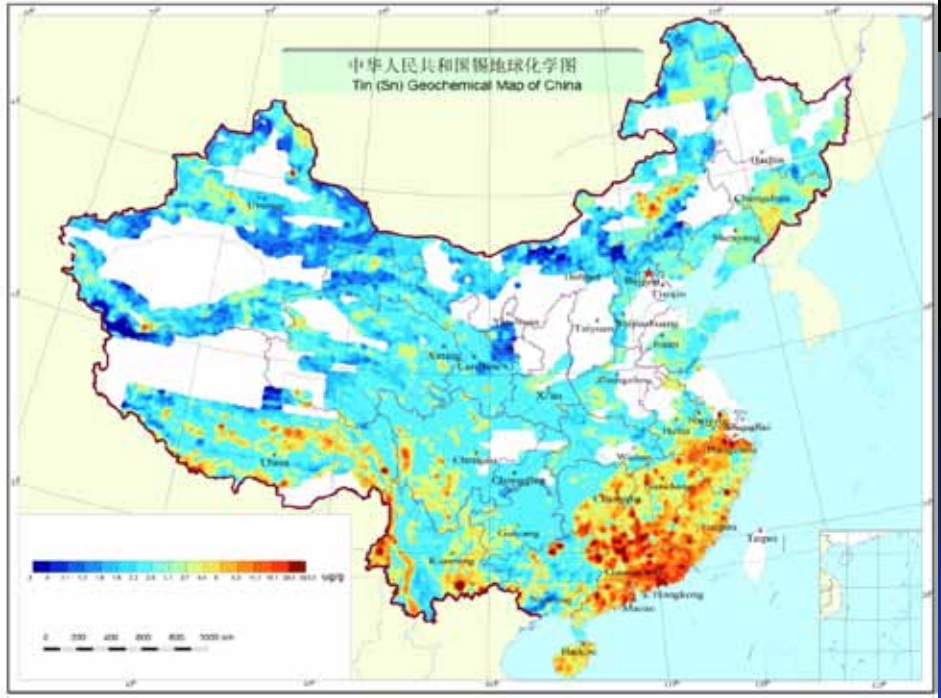


The RGNR Coverage until 2005



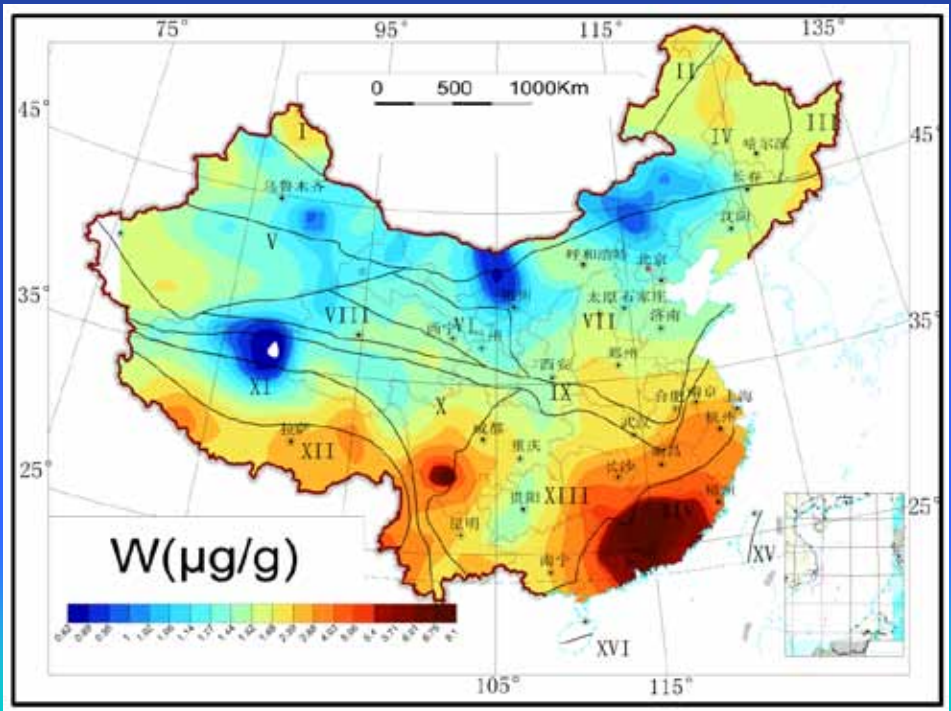
Map sheet: 1:200 000





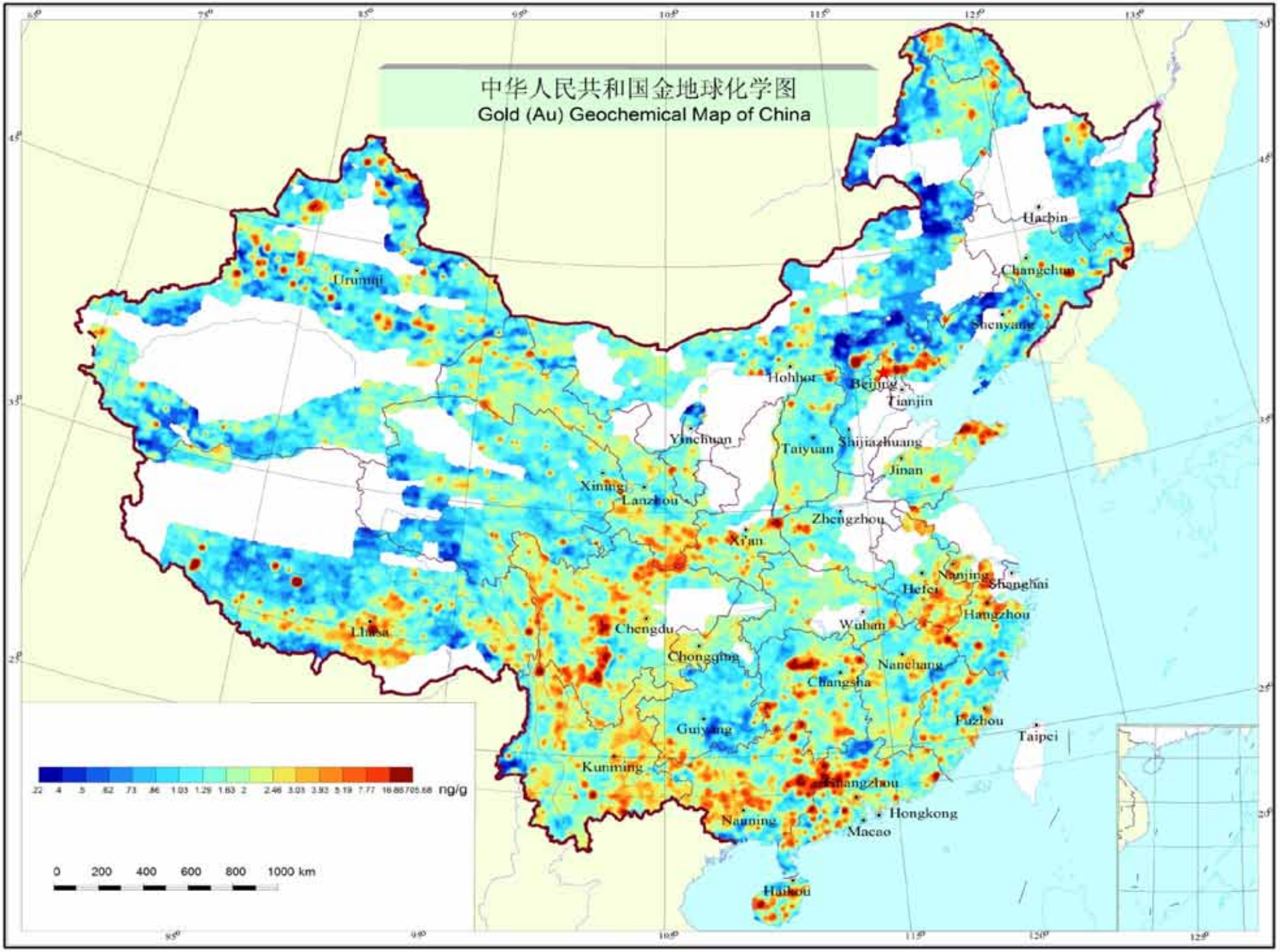
W Maps by Regional-scale stream sediment sampling

1.5 million samples



W Maps by Global-scale floodplain/overbank sediment sampling

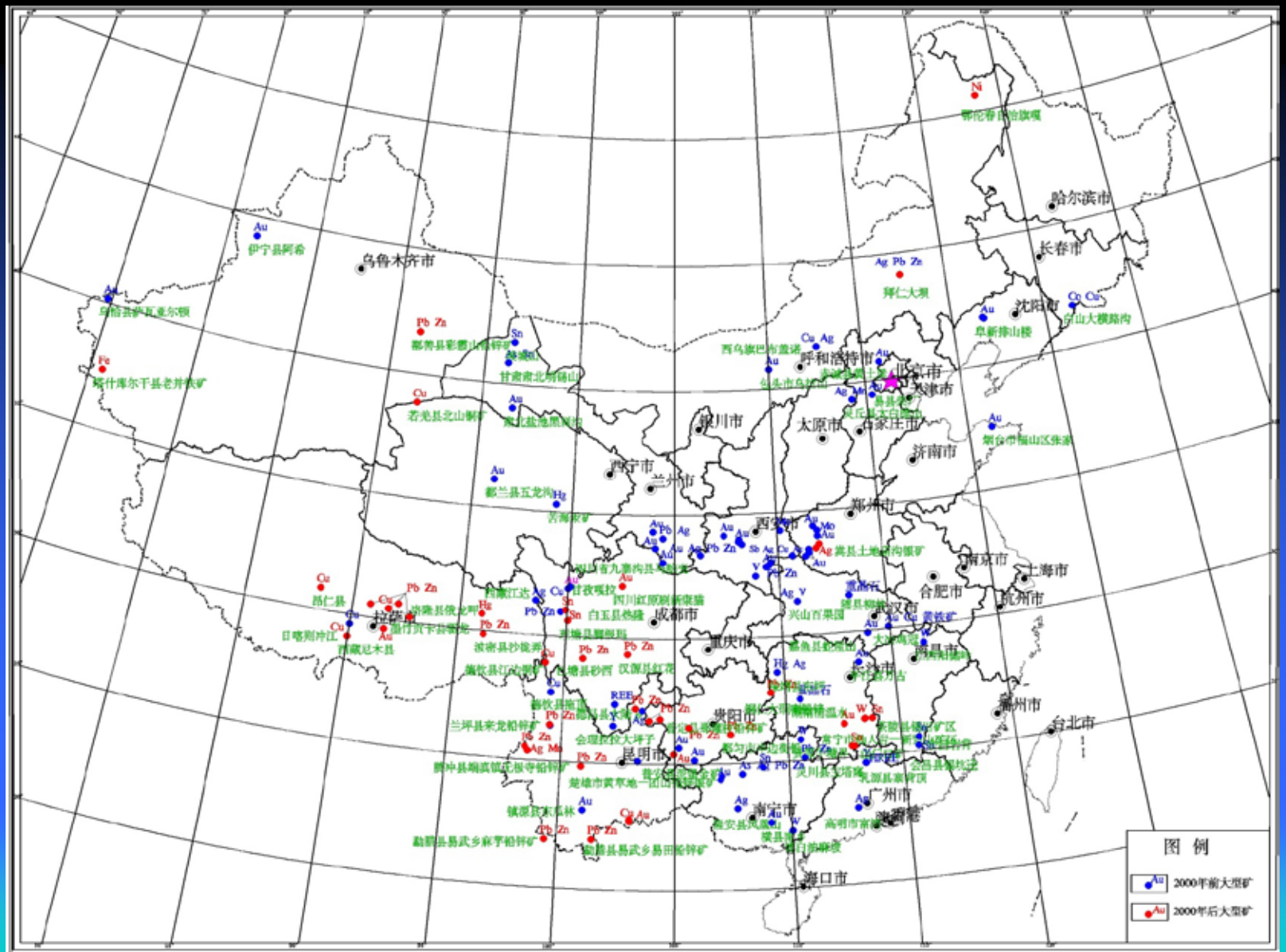
500 samples


中华人民共和国金地球化学图
Gold (Au) Geochemical Map of China
Harbin
Changchun
Shenyang
Urumqi
Hohhot
Beijing
Tianjin
Yinchuan
Taiyuan
Shijiazhuang
Jinan
Xining
Lanzhou
Zhengzhou
Xi'an
Nanjing
Shanghai
Hefei
Hangzhou
Lhasa
Chengdu
Wuhan
Chongqing
Nanchang
Changsha
Fuzhou
Taipei
Guiyang
Kunming
Fuzhou
Nanning
Hongkong
Macao
Haikou
22 4 5 62 73 86 1.03 1.29 1.63 2 2.46 3.03 3.92 5.19 7.77 16.88 705.68 ng/g
0 200 400 600 800 1000 km

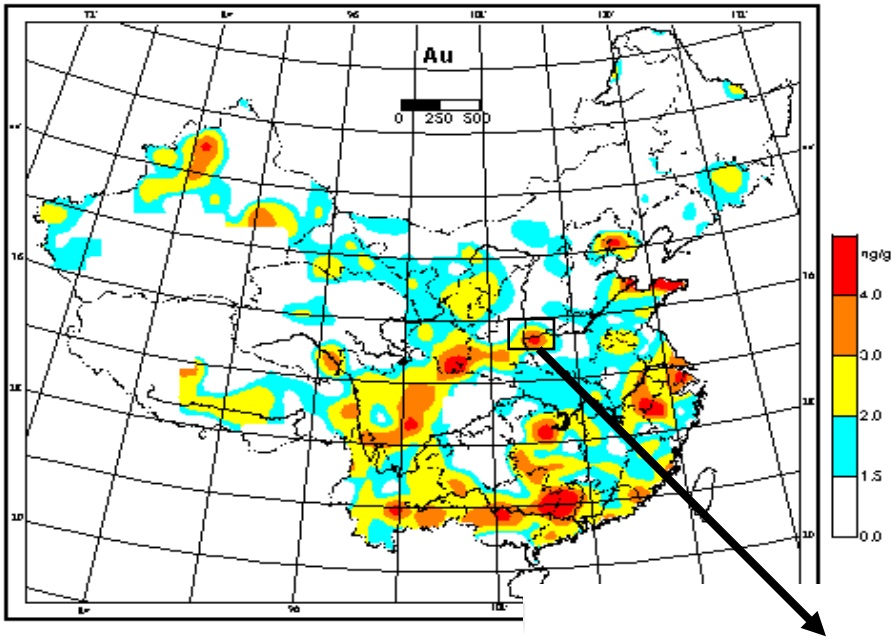
Number of geochemical anomalies and ore deposits discovered

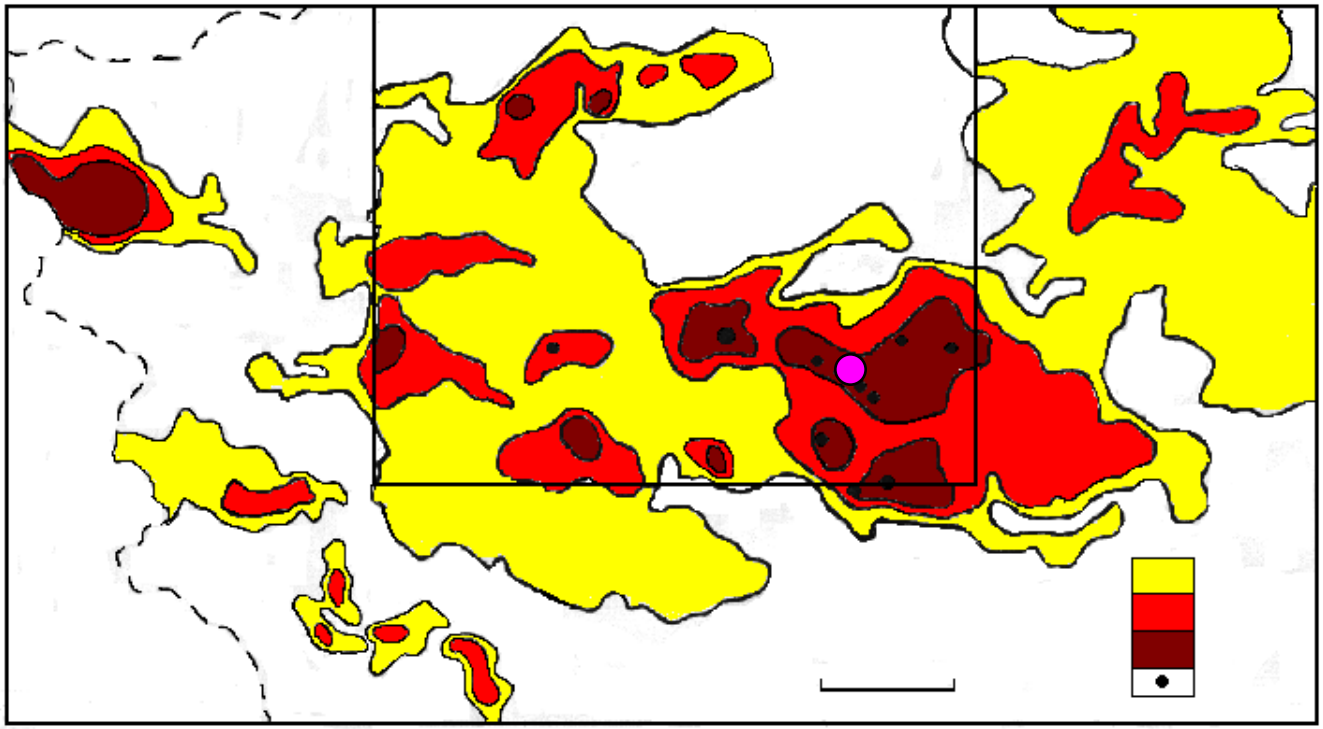
	1 anomalies	2 Follow-up survey	3 drilling	4 deposits	Probability (%) 4/1	4/2	4/3
81-85	11 282	4 671	614	443	3.9	9.5	72.1
86-90	11 728	3 726	626	463	3.9	12.4	74.0
91-95	19 870	3 892	1 074	756	3.8	19.4	70.4
total	42 880	12 289	2 314	1 662	3.9	13.5	71.8

Discoveries of Large Ore Deposits by Geochemical Survey

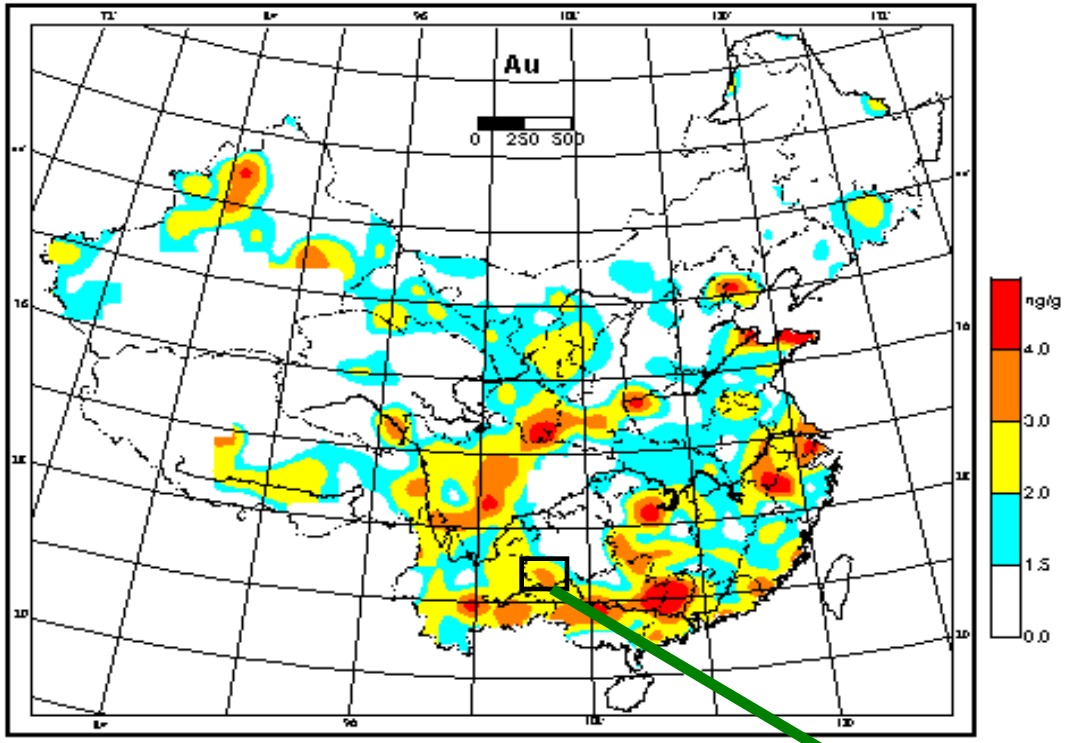


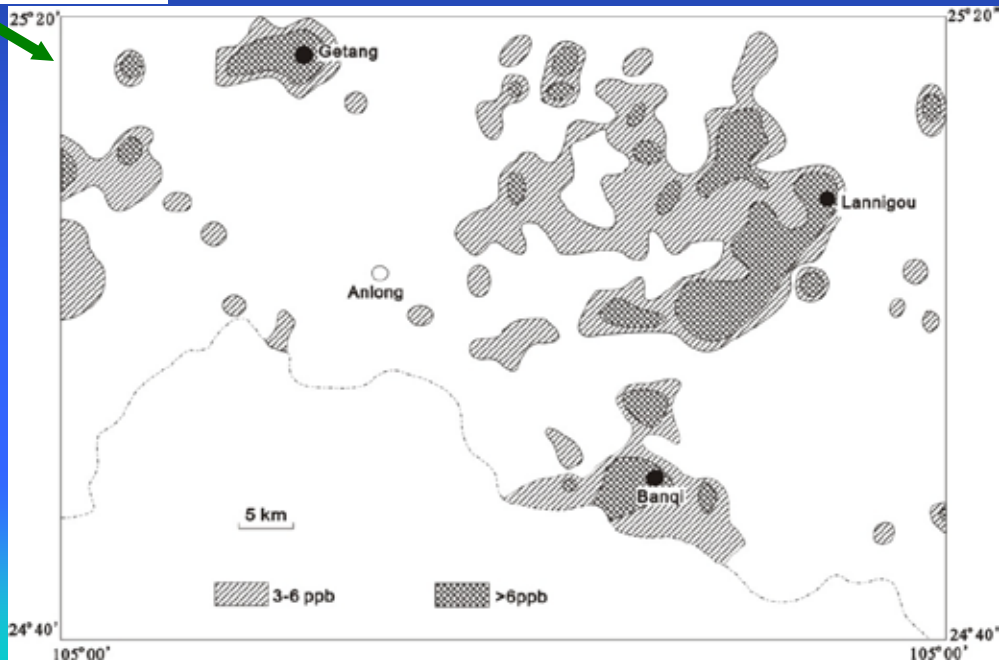
The first gold deposit discovered by geochemical mapping in China



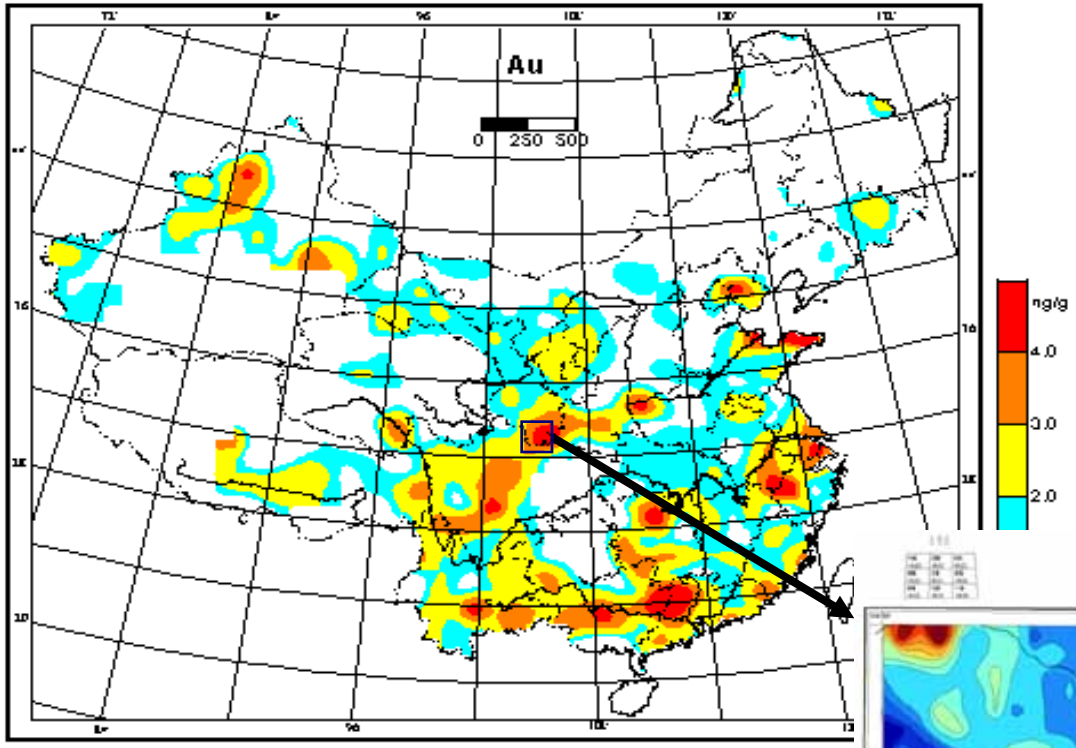


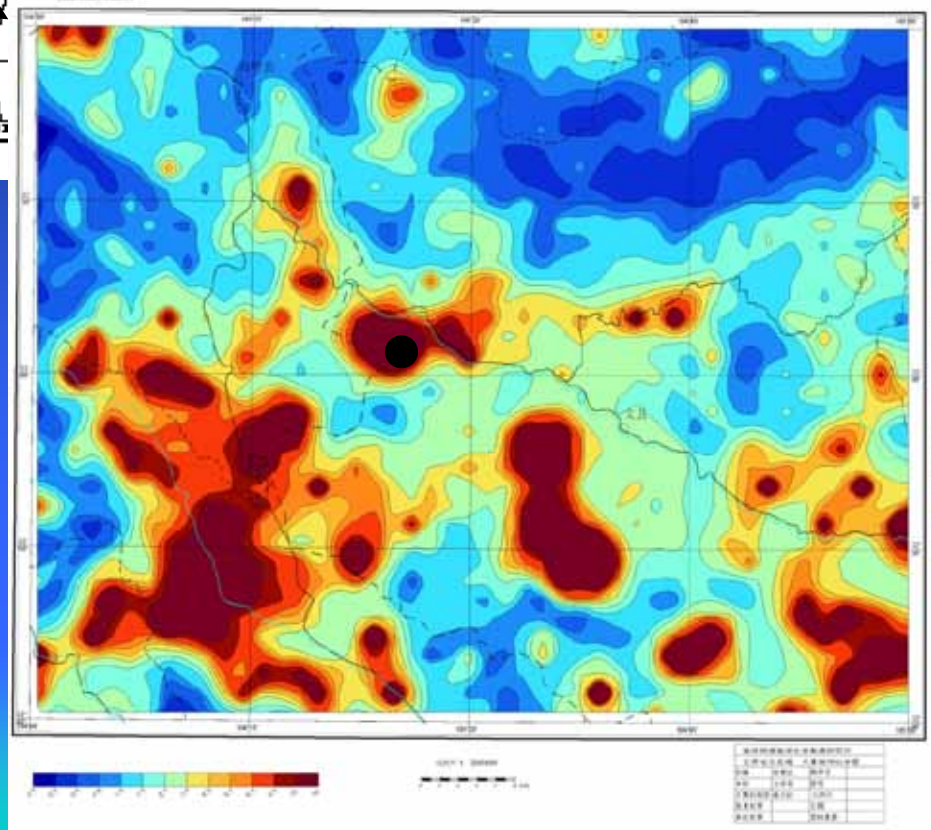
Carlin-type gold deposit cluster discovered



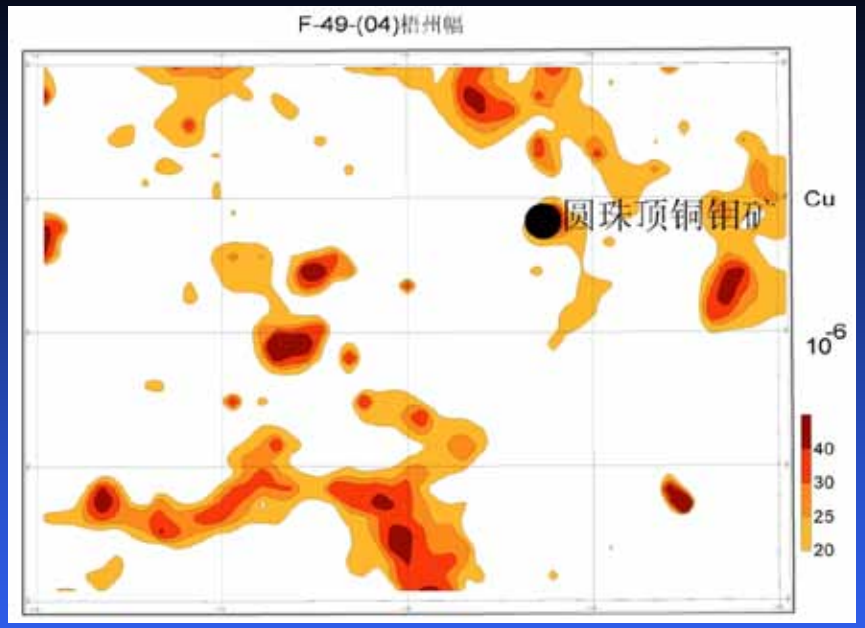


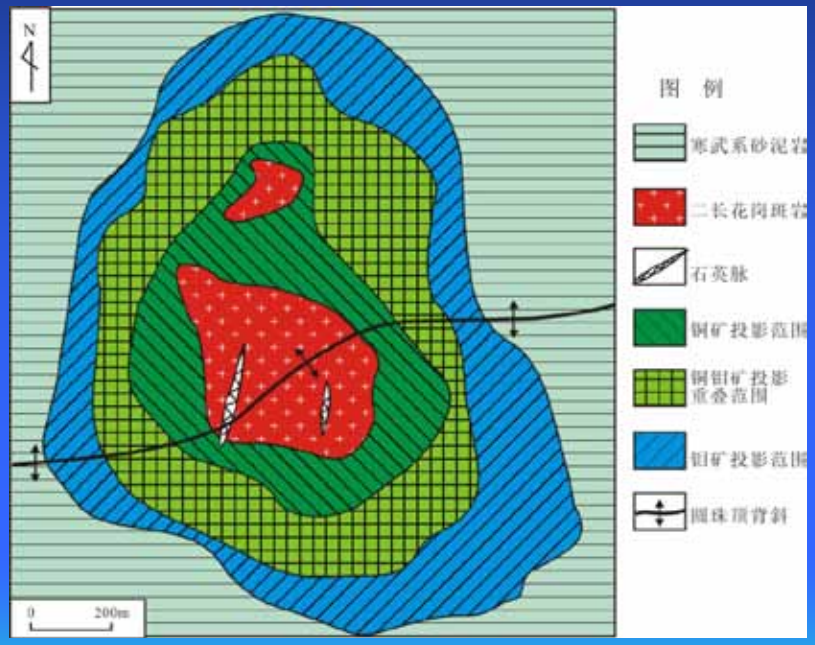
The largest gold ore deposit discovered in China





Concealed Porphyry Copper Deposit Discovered by Geochemical Mapping

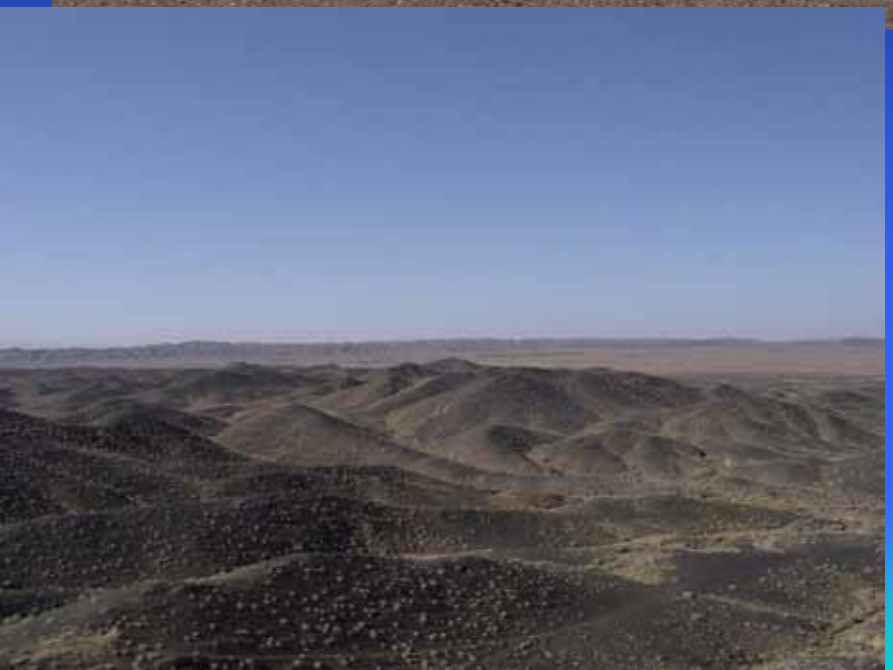




Regional Geochemical Survey in Remote Terrains

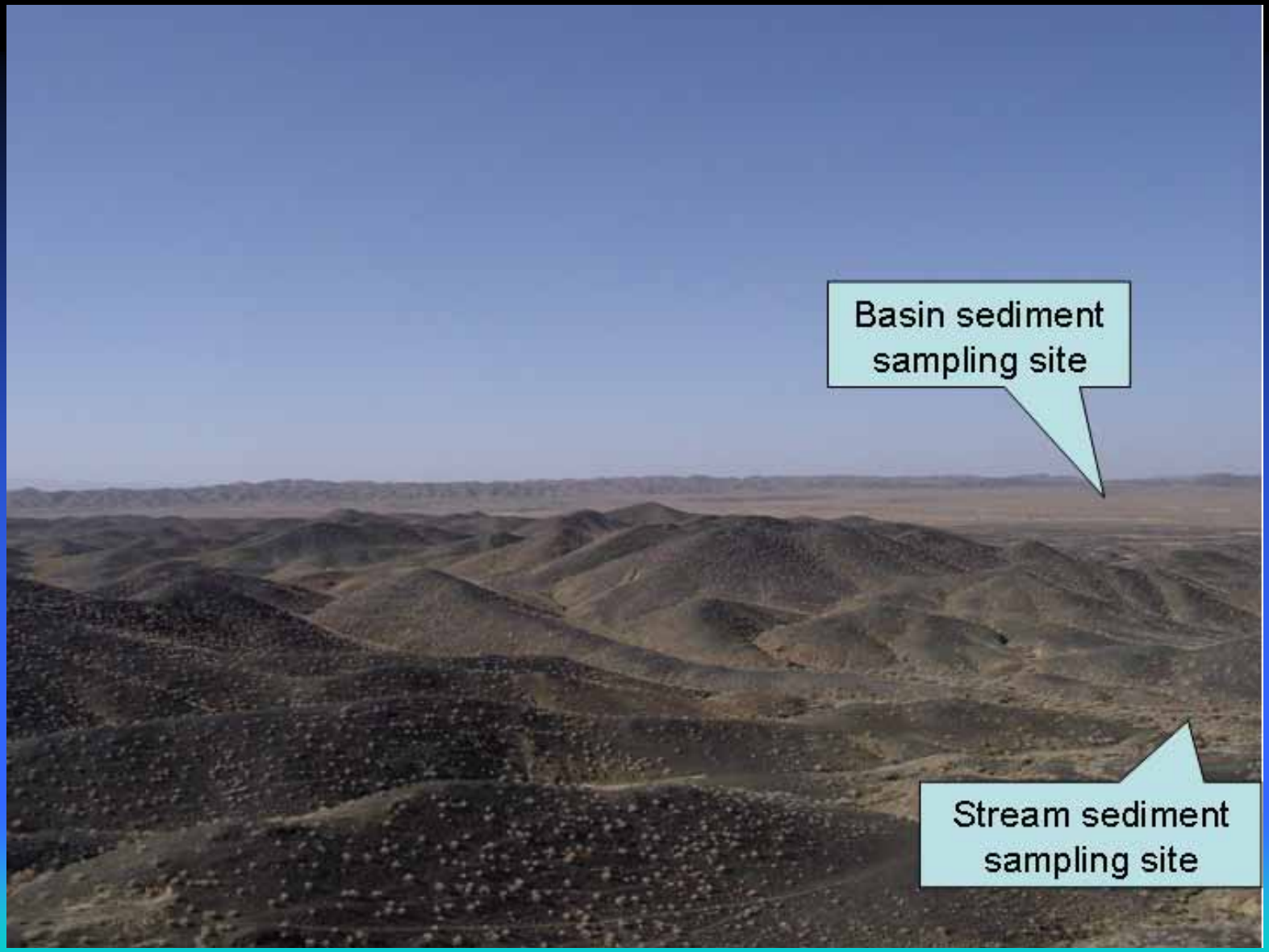
- Stream sediments are not available
- Widely covered by regolith materials (soils, windblown sand, laterite etc.)

Gobi desert



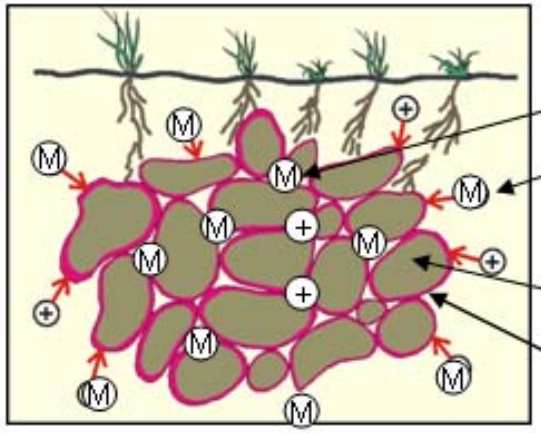
Semi-desert grassland

Sampling patterns for regional geochemical mapping

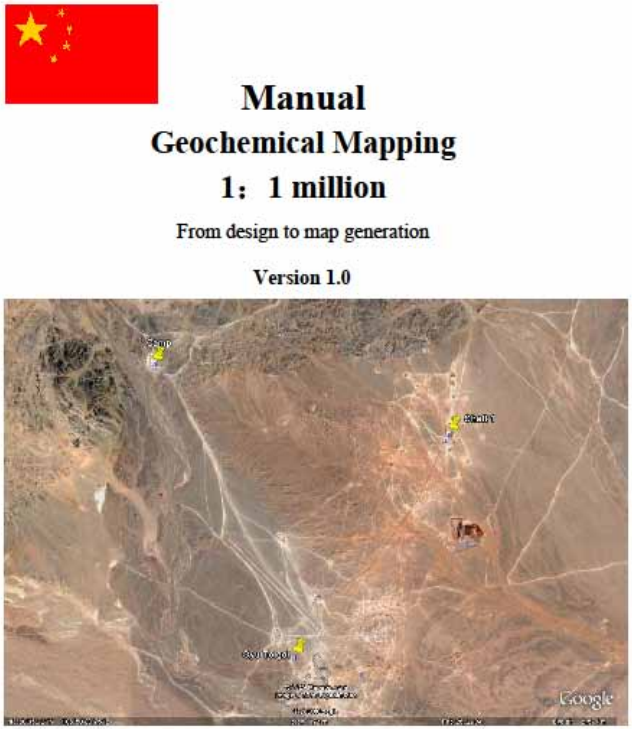



Drainage catchment sediments

Clay-rich horizon sampling



Development of technology and preparation of standards for geochemical mapping



Manual

Geochemical Mapping

1：1 million

From design to map generation

Version 1.0

China-Mongolia Geochemical Mapping Project

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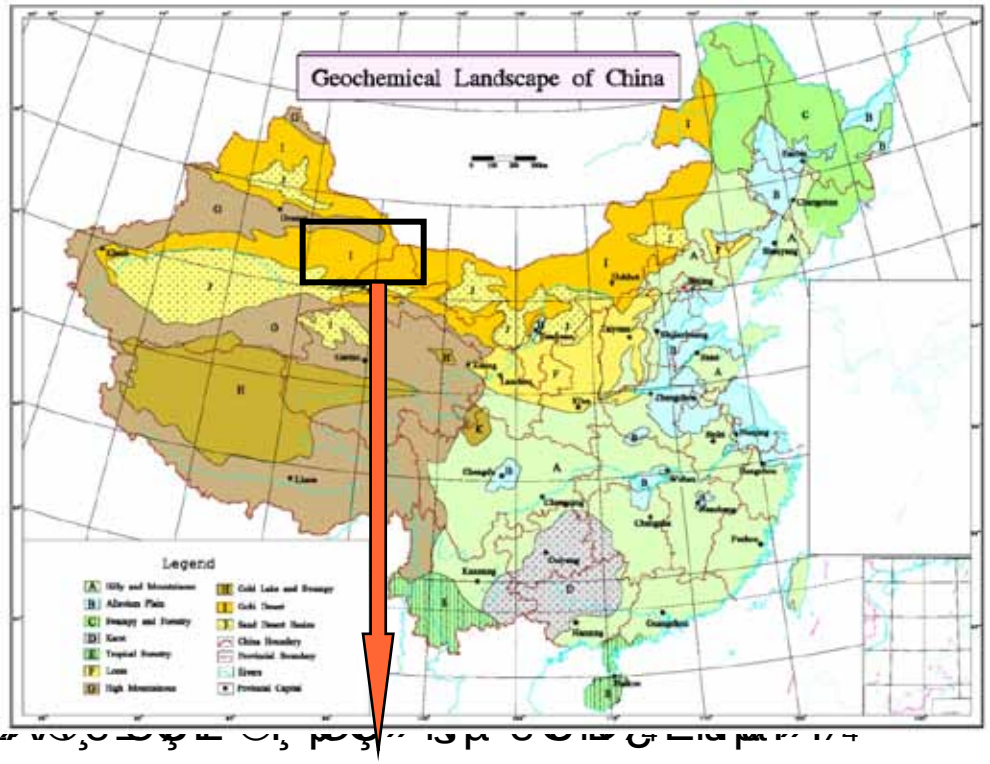
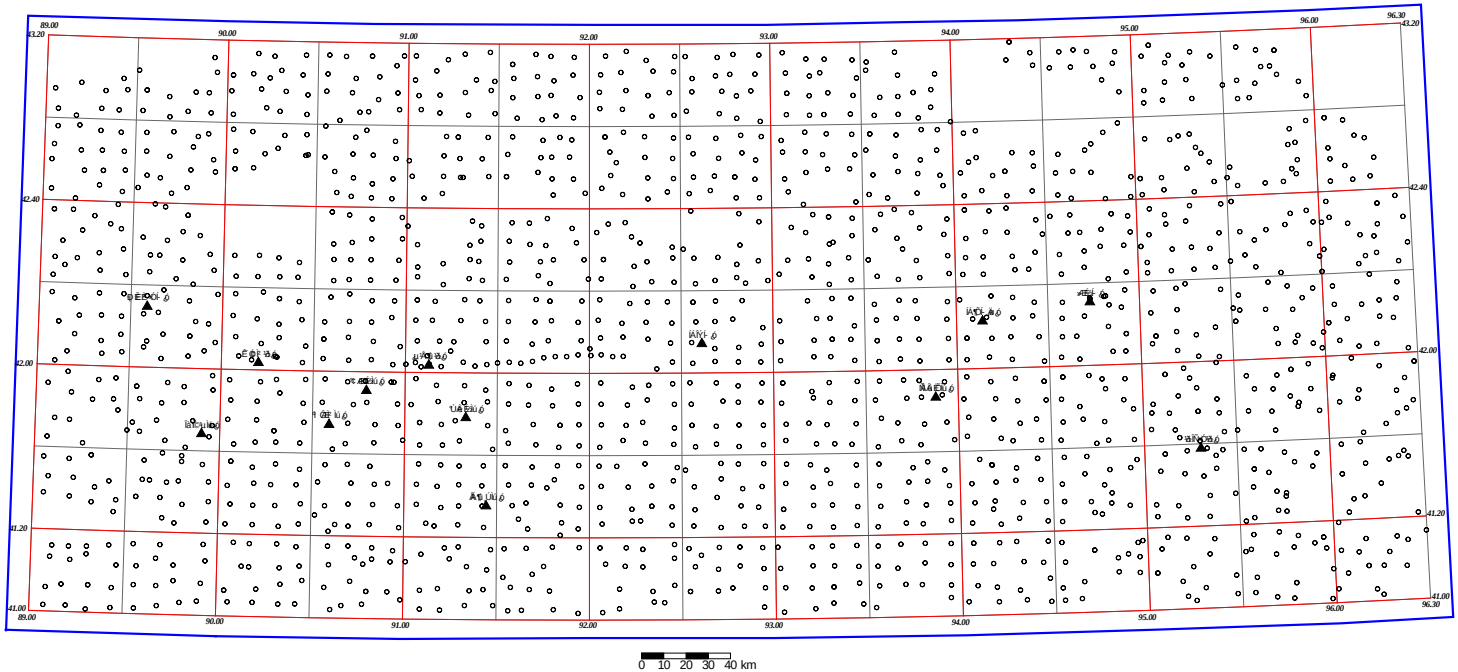
geochemistry@sina.com, geochemistry@igge.cn

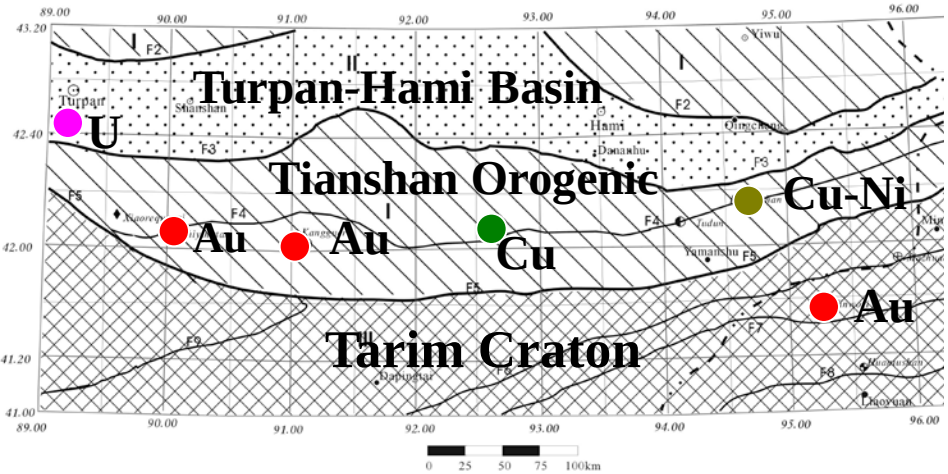
An Example: Regional Geochemical survey in Tianshan desert terrains



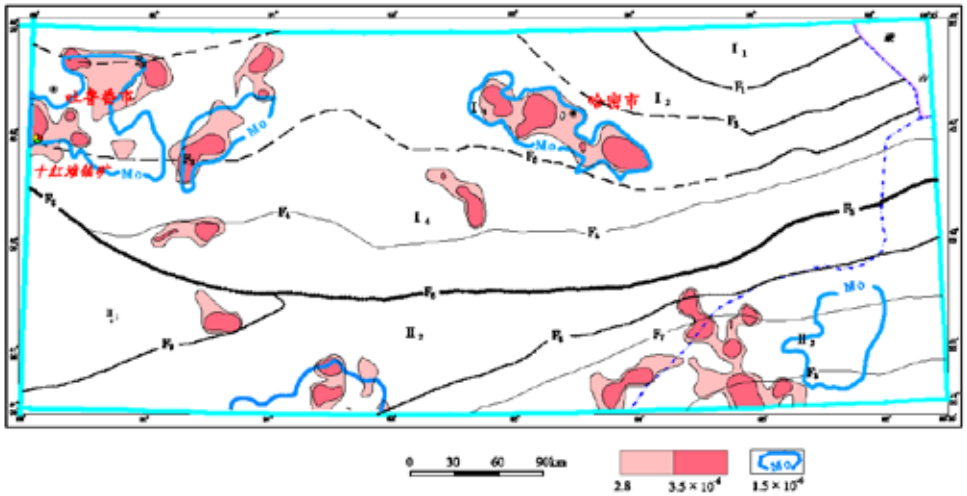


Geochemical Survey in Desert terrains

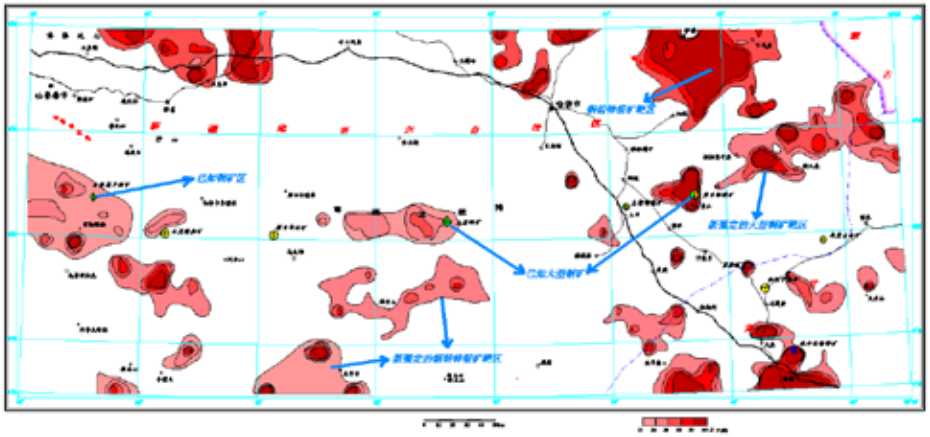
Tectonic structure with deposits



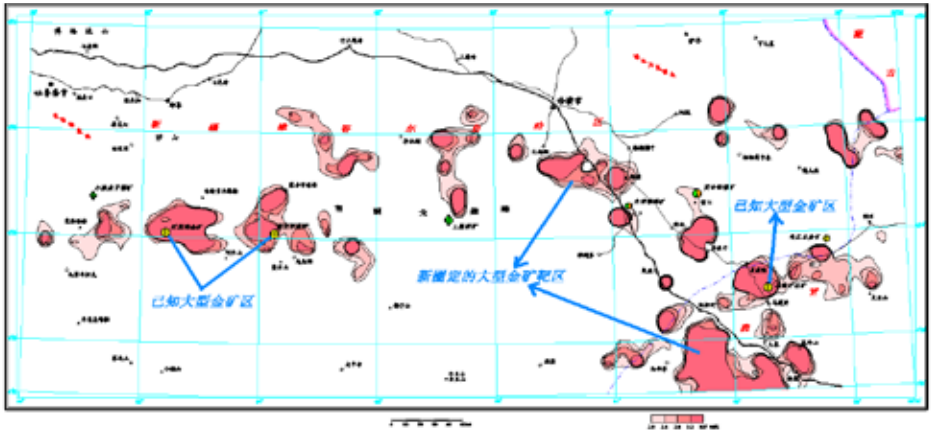
Geochemical provinces of Uranium



Geochemical provinces of Cu(Ni)-Pb-Zn

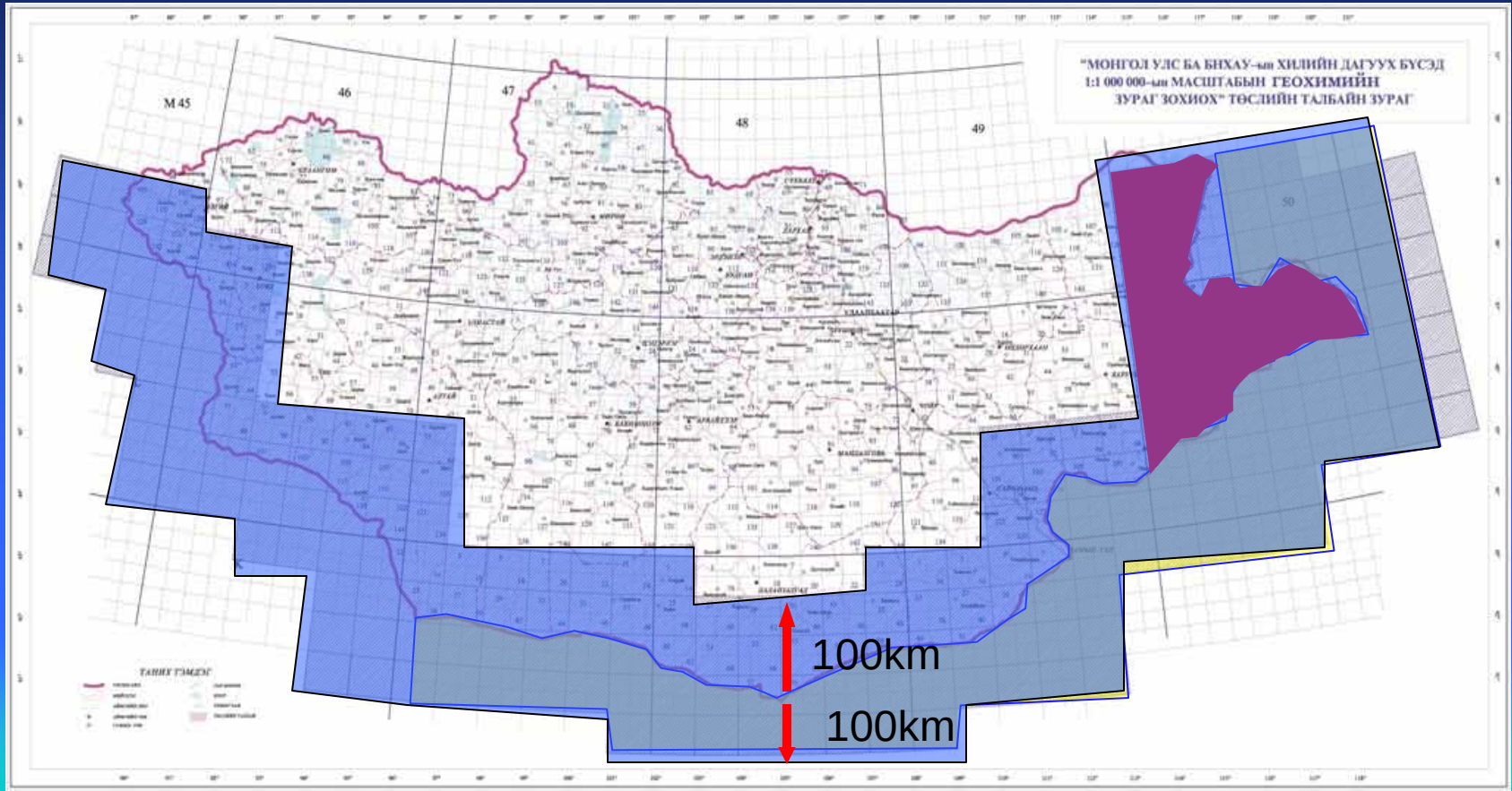


Geochemical provinces of Gold

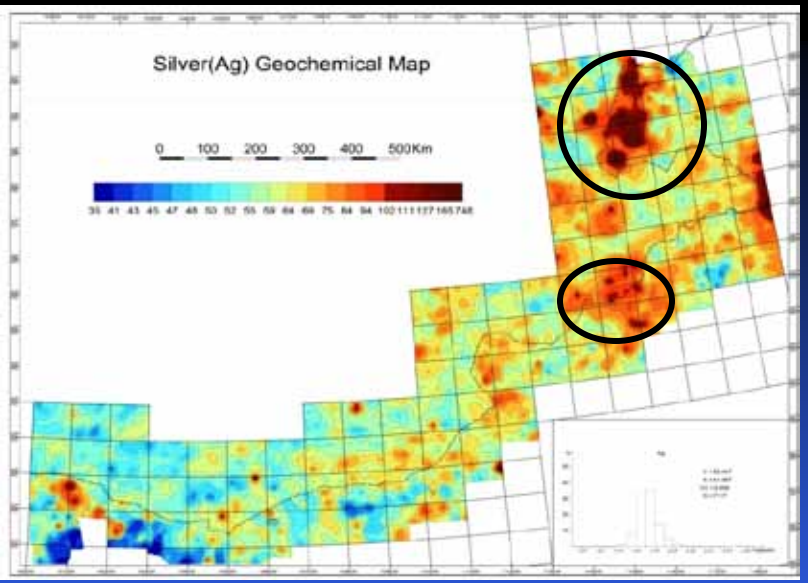


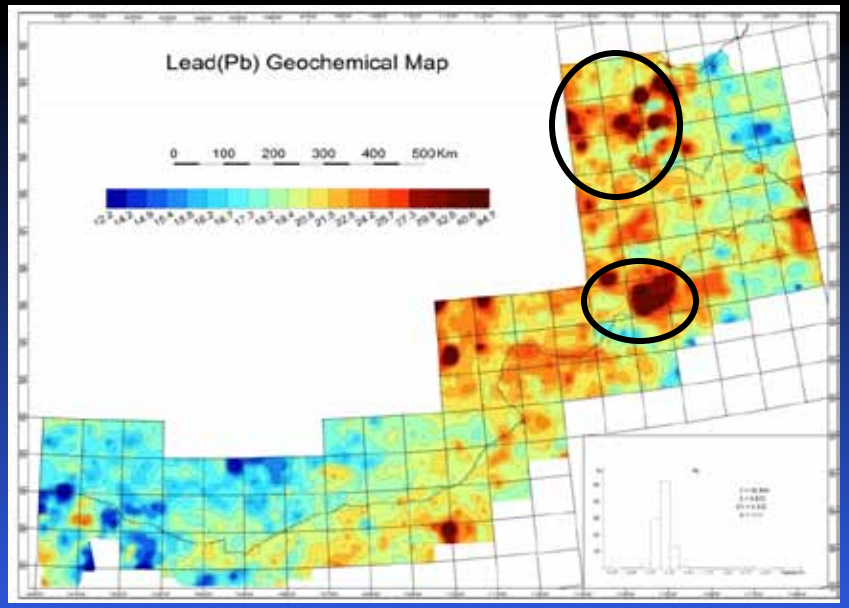
Cooperation: Geochemical Mapping Across China and Mongolia Boundary Region

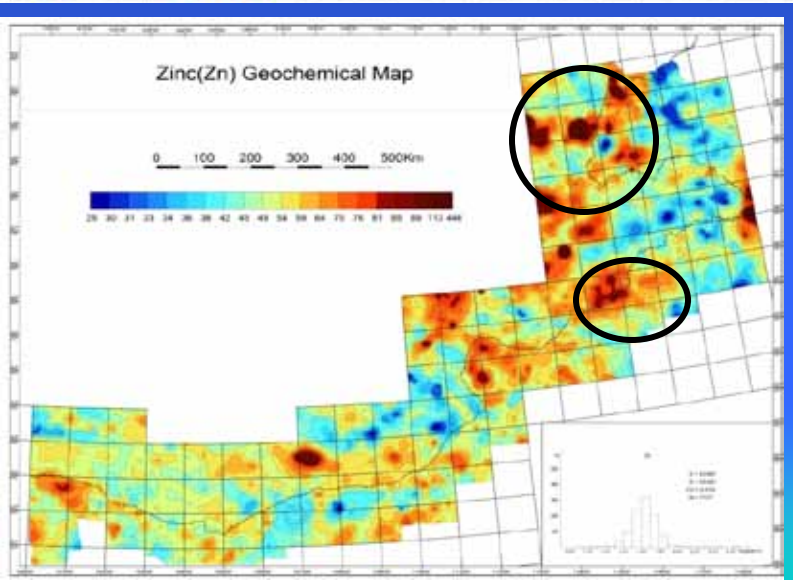
- **Along the Sino-Mongolian border and extending 100 km into both sides, the areal dimension is about 1.3 million square kilometres.**

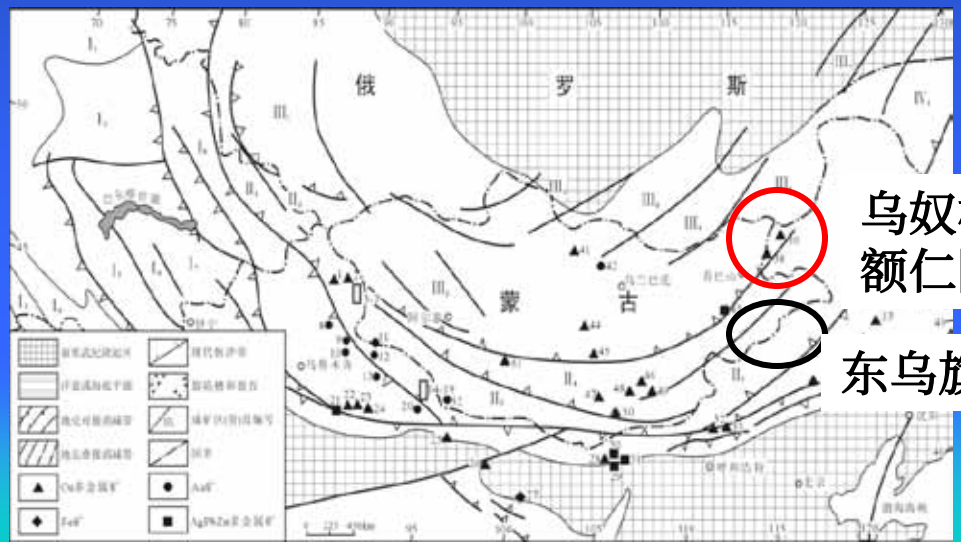


Geochemical Maps of Elements Related to Polymetallic Mineralisation Across the Sino-Mongolian borders

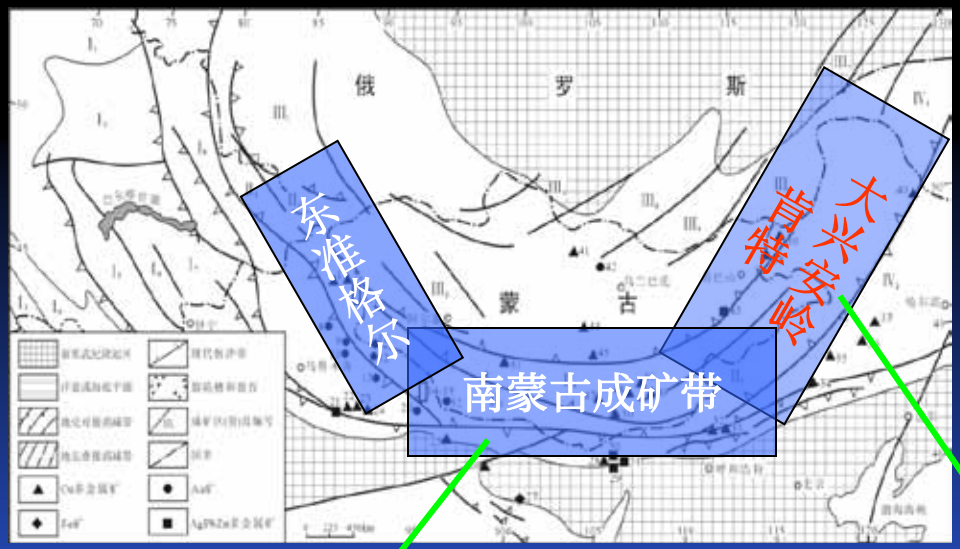


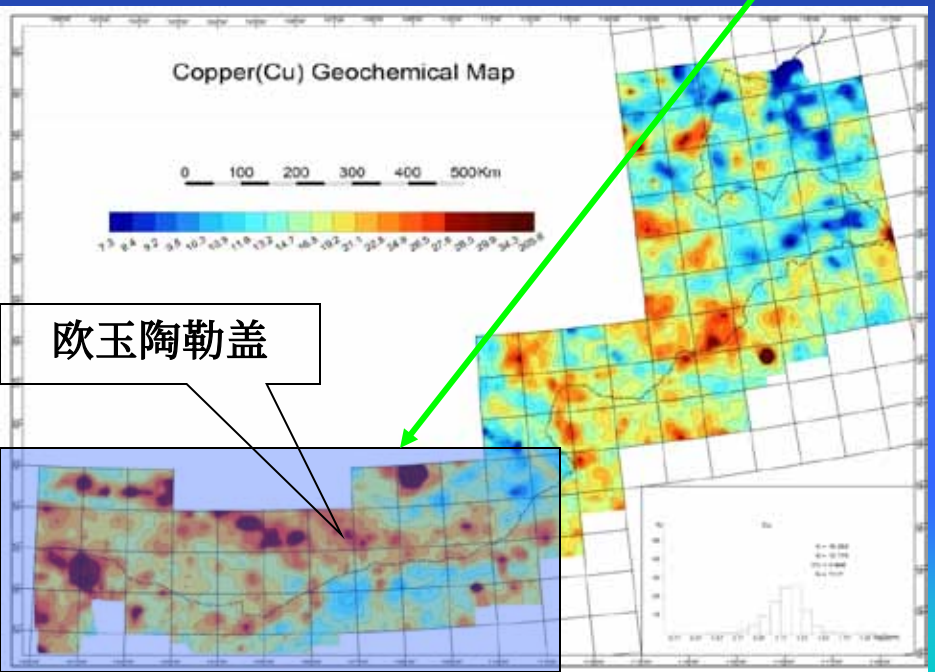


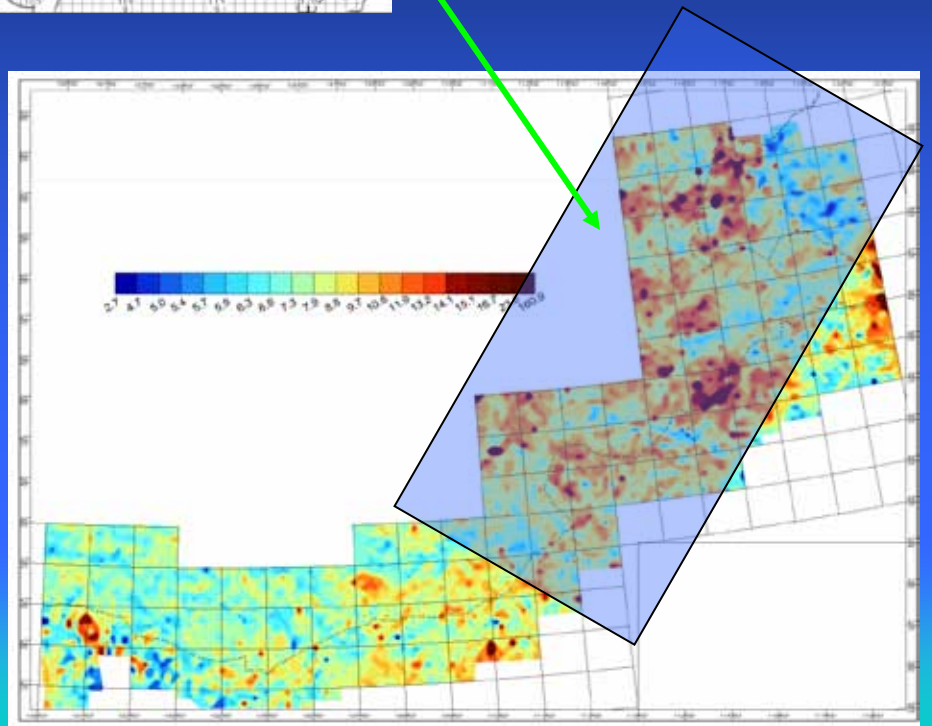




Distribution of the main ore-forming elements







Thanks

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