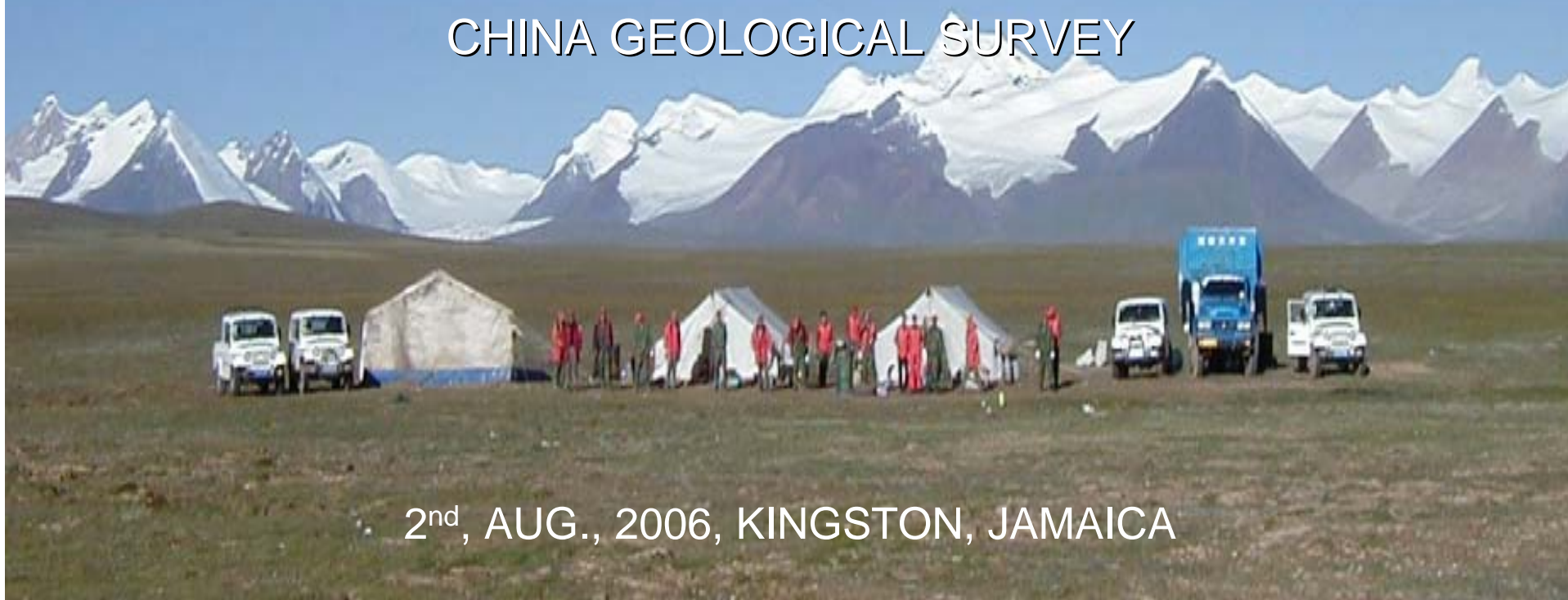


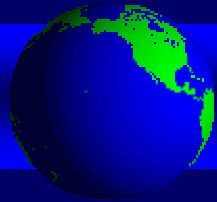
# *MINERAL RESOURCES IN CHINA*

## **MINERAL RESOURCES IN CHINA**

ZHANG HONGTAO, ZHANG HAIQI  
CHINA GEOLOGICAL SURVEY



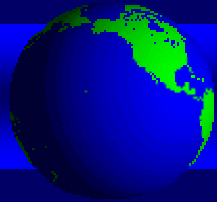
2<sup>nd</sup>, AUG., 2006, KINGSTON, JAMAICA



# MINERAL RESOURCES IN CHINA

## BASIC GEOLOGICAL WORK

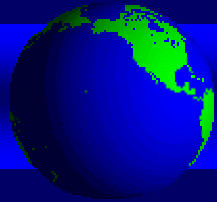
- 1:250,000 scale has been completed in 2005
- the different scales of regional geochemical exploration, hydrogeology, gravity and airborne magnetic survey have been carried out
- 171 minerals have been discovered, the reserve of 158 of them have been proved, over 200,000 mineral occurrences and spots have been found
- more than 10,000 large & medium-scale mine enterprises
- 240,000 small-sized mine enterprises in China, as well as of the 145,000 Mining Rights



# MINERAL RESOURCES IN CHINA



- 92% of energy and over 80% of industry raw materials comes from mineral resources
- The output of solid mineral ores is more than 5 billion tons, the values of the mining industry and the related industry is over 2,000 billion Yuan (Chinese Dollar)
- It is the third place for China's mineral production in the world

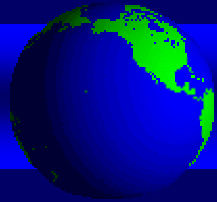


# *MINERAL RESOURCES IN CHINA*

## **1. Exploitable Reserves of Main Metal Minerals in China**

### **Basic situation of metal minerals in China:**

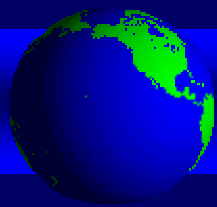
- a) Resource amounts of iron, manganese, aluminum and copper is large, but they are low grade, associated with other minerals, and difficult for processing
- b) It is rich and high quality for tungsten, tin, rare earth, molybdenum and antimony in the world, but they are not consumed much in China
- c) The reserve percentage proved is most in low geological work area
- d) The continent of China is located in the cross region of three metallogenetic belts of pan Pacific Ocean, Paleo Asia Ocean and Paleo Tethys Ocean which is strong activity of lava and structure. It is a potential area for mineral prospecting.



# *MINERAL RESOURCES IN CHINA*

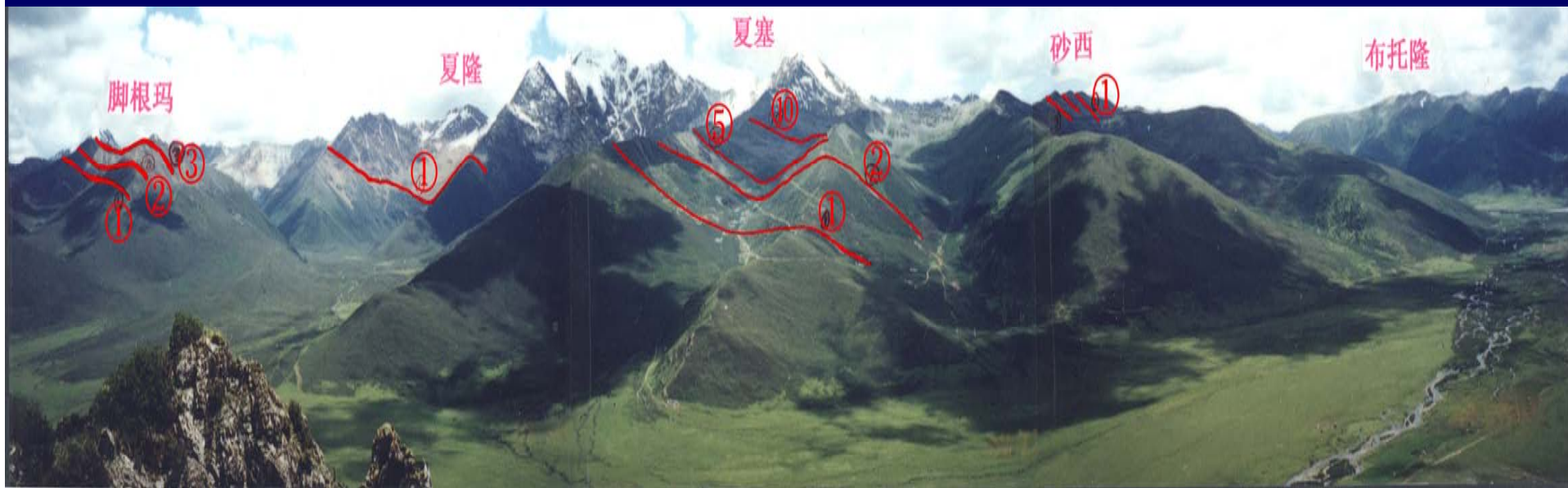
- The increasing speed of most mineral commodity consumption in China is faster than the production speed since 1990
- The production speed is greater than the speed of reserves increasing, so the reserves of petroleum, coal, copper, iron, manganese and chromium have been decreased
- The shortage of petroleum, natural gas, coal, iron, manganese, chromite and copper is increasing
- The current reserves of 45 main minerals, only 24 of them can meet the consumption demand till to 2010

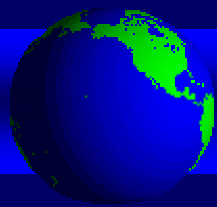




# MINERAL RESOURCES IN CHINA

- 6 of them can meet the consumption demand to 2020
- The reserve reduced fast in recent 5 years, Comparing with the year of 2001, the proved reserve of copper, zinc, nickel, cobalt, tungsten, molybdenum, rare earth elements is going to be reduced in 2005

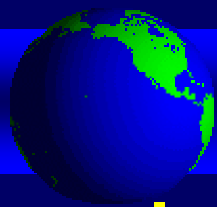




# MINERAL RESOURCES IN CHINA

**TABLE 1. THE RESERVES OF METAL MINERALS AND EXPLOITABLE RESERVE BY THE END OF 2004**

Names	Unit ( * thousand tons)	Proved Reserve	Compared with 2001	Reserves	Compared with 2001
Iron	Billion tons (ores)	581.51	+0.22	117.33	-3.97
Manganese	10 (ores)	72456.9	+698	12558.7	-106
Copper	10 * (metal)	6659.0	-258.0	1753.6	-188.3
Bauxite	10 * (ores)	25.95	+1.24	5.59	+0.53
Lead	10 * (metal)	3906.5	+166.8	824.4	+111.3
Zinc	10 * (metal)	9224.9	-537.0	2686.8	+305.0
Nickel	10 * (metal)	795.67	-32.22	239.83	-20.91
Cobalt	10 * (metal)	63.33	-1.32	3.88	-1.02
Tungsten	10 * (WO <sub>3</sub> )	572.53	-10.7	144.24	+8.83
Tin	10 * (metal)	481.23	-25.67	78.92	-9.87
Molybdenum	10 * (metal)	875.65	-86.24	162.32	-32.69
Gold	Tons (metal)	4560.24	+92.34	1362.33	-22.47
Silver	Tons (metal)	126102	+6497	28770	+5444
Rare Earth	10 * (oxide )	8882.9	-170.0	2015.6	-113.31



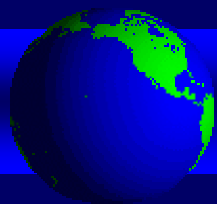
# MINERAL RESOURCES IN CHINA

## 2. Supply and Demand of Metal Minerals in 2005

TABLE 2: IMPORT/EXPORT OF MAIN METAL MINERALS IN CHINA  
(Unit: Ten Thousand US Dollar)

Name of Commodity	Unit ( $\times 10$ )	Export		Import	
		Amount	Dollar	Amount	Dollar
Iron ore (washed sands) and concentration	thousand tons			27526	1,837278
Pig iron and iron glance	thousand tons	223	66651		
Steel scrap	thousand tons			1014	261049
Billet and forged piece	thousand tons	707	267284	131	68054
Steel products	thousand tons	2052	1307968	2582	2460845
Manganese sands and concentration	thousand tons			458	68348
Not forged manganese	thousand tons	29	42433		

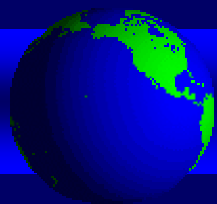




# MINERAL RESOURCES IN CHINA

Name of Commodity	Unit(× 10)	Export		Import	
		Amount	Dollar	Amount	Dollar
Chromium sands and concentration	thousand tons			302	59557
Copper sands and concentration	thousand tons			406	370672
Copper scrap	thousand tons			482	317991
Not forged copper (include copper hardener)	thousand tons	14	54982	142	494967
Copper products	Thous. tons × 10	46	207366	112	437824
Aluminum oxide for refinery	Thous. tons × 10	2	1386	702	259717

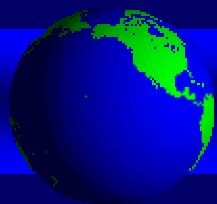
SUPPLY AND DEMAND OF METAL MINERALS IN 2005



# MINERAL RESOURCES IN CHINA

Name of Commodity	Unit( $\times 10$ )	Export		Import	
		Amount	Dollar	Amount	Dollar
Scrap aluminum	Thousand tons ( $\times 10$ )			169	136859
not forged aluminum (aluminum alloy)	Thousand ( $\times 10$ )	132	237952	64	101849
Aluminum products	Thousand ( $\times 10$ )	71	195089	65	225102
Zinc oxide	Tons	62205	6920		
Lithopone	Tons	79697	2938		

SUPPLY AND DEMAND OF METAL MINERALS IN 2005

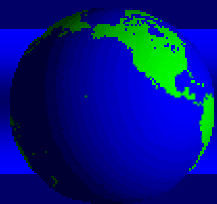


# MINERAL RESOURCES IN CHINA

Name of Commodity	Unit( $\times 10$ )	Export		Import	
		Amount	Dollar	Amount	Dollar
Not forged zinc and alloy	Thousand ( $\times 10$ )	15	19583		
Not forged tin and alloy	Thousand ( $\times 10$ )	2.7	19865		
Not forged antimony, powder scrap	Thousand ( $\times 10$ )	2.9	8292		
Tungstate	Thousand ( $\times 10$ )				
APT	Thousand ( $\times 10$ )	0.8	13557		

imported of iron ores(57%) / copper(70%) /aluminum & lead(50%) / zinc(20%)

SUPPLY AND DEMAND OF METAL MINERALS IN 2005

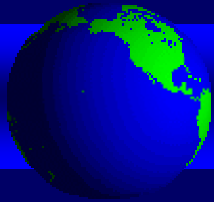


# MINERAL RESOURCES IN CHINA

## TABLE 3. DEMAND OF METAL MINERALS IN 2005

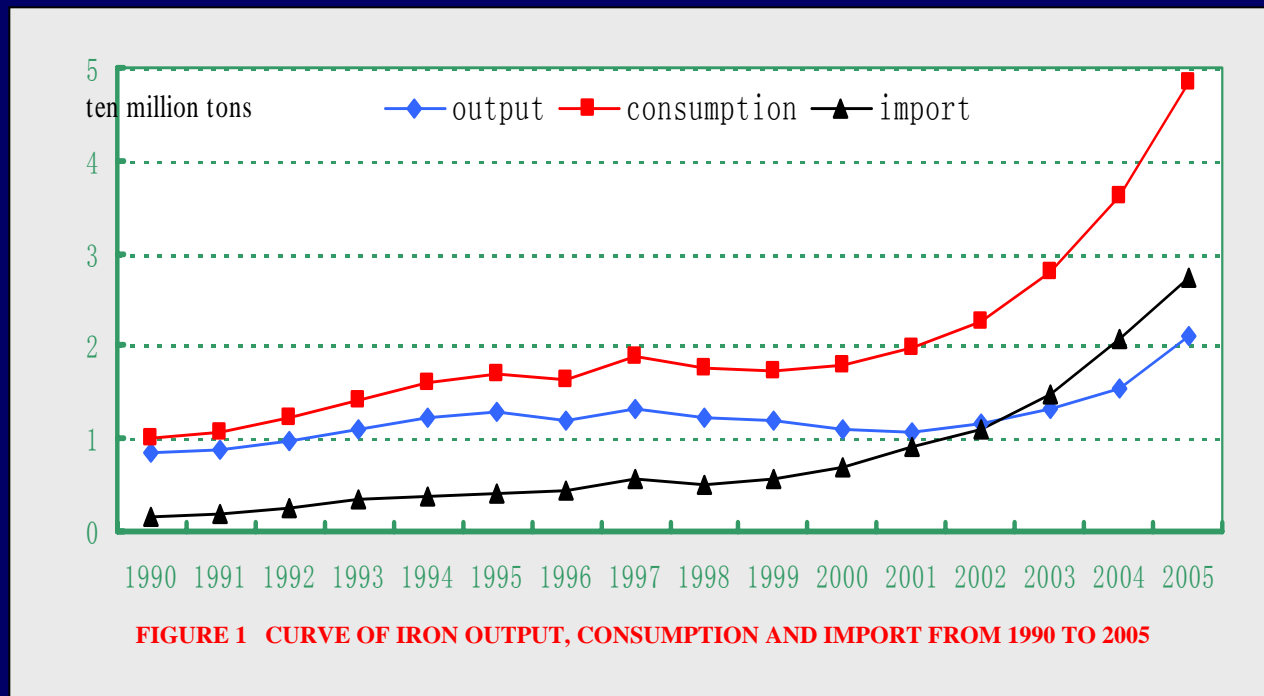
Name	Unit *	demand	compare with 2001	Name	Unit	Demand	compare with 2001
Iron	Ore *	9.7(ore)	142	Cobalt	Metal tons	9000	
Manganese	Ore *	1077	125	Tungsten	WO <sub>3</sub> *	2.23	94
Copper	Met *	366.5	59	Tin	Metal *	11.55	86
Aluminum	Met *	711.9	104	Molyb.	Metal *	1.63	
Lead	Met *	194.0	155	Gold	Metal tons	235	20
Zinc	Met *	292.6	93	Silver	Metal tons	2630	75
Nickel	Met *	20.8	135	Thulium	oxide *	5.19	130

\* thousand × 10

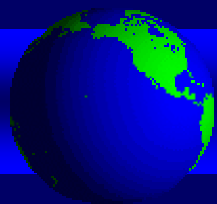


# MINERAL RESOURCES IN CHINA

the output of 420 million tons of iron ore in 2005, about 210 million tons of end products, it is 200% of output of year 2001. About 275 million tons of iron ores were imported, 485 million tons of iron ore were consumed in total, the percentage of import iron ore increase from 14.15% in 1990 to 57% in 2004

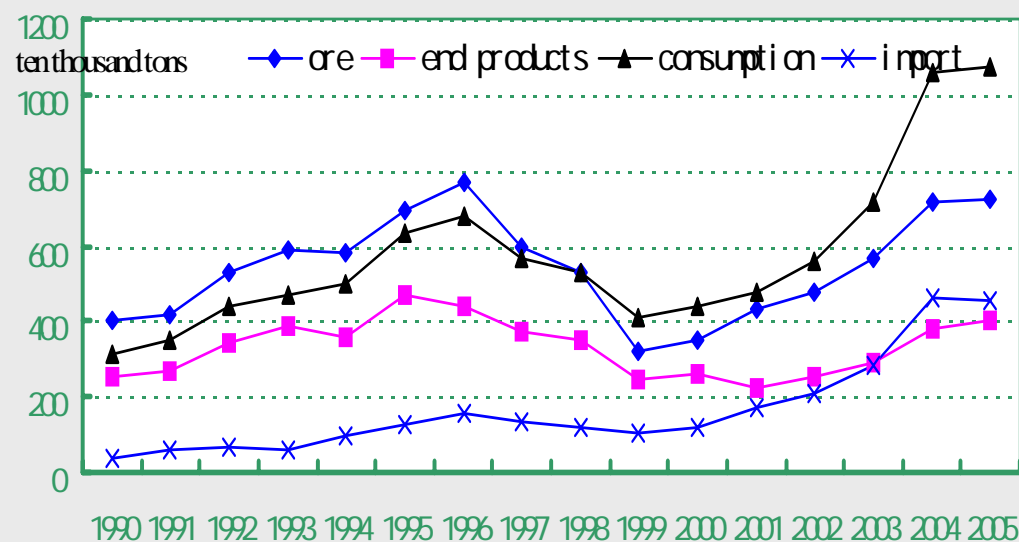


## IRON



# MINERAL RESOURCES IN CHINA

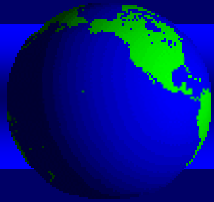
the output of 7.185 million tons in 2005, import 4.58 million tons of manganese sands, it is about 60% of total consumption. Total consumption is 10.77 millions tons



**MANGANESE:**

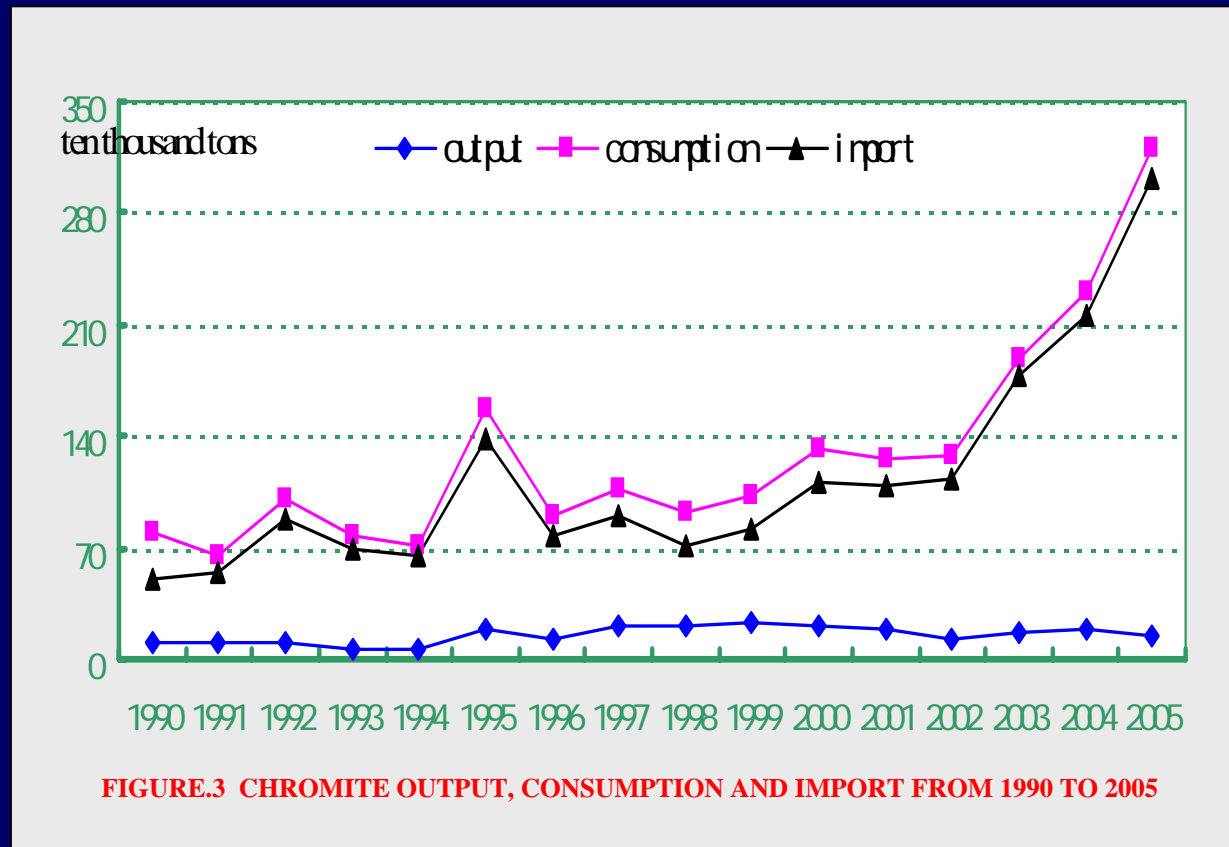
**FIGURE 2 MANGANESE OUTPUT, CONSUMPTION AND IMPORT FROM 1990 TO 2005**  
import high grade ores, end product=1:1.5; ores in China, end product=1.5~1.9:1



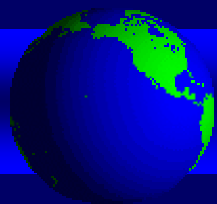


# MINERAL RESOURCES IN CHINA

150,000 tons of chromium produced in China in 2005, the import of 3.02 million tons, about 95% of total consumption in China



## CHROMIUM



# MINERAL RESOURCES IN CHINA

790,000 tons of concentration produced in 2005, and 3.665 million tons of fine copper were consumed. 4.06 tons of copper sands were imported in 2005, at same time, a lot of raw copper, refinery copper, copper hardener and cooper products and copper scrap (imported 4.82 million tons). About 60% of copper needs imported in 2005

## COPPER

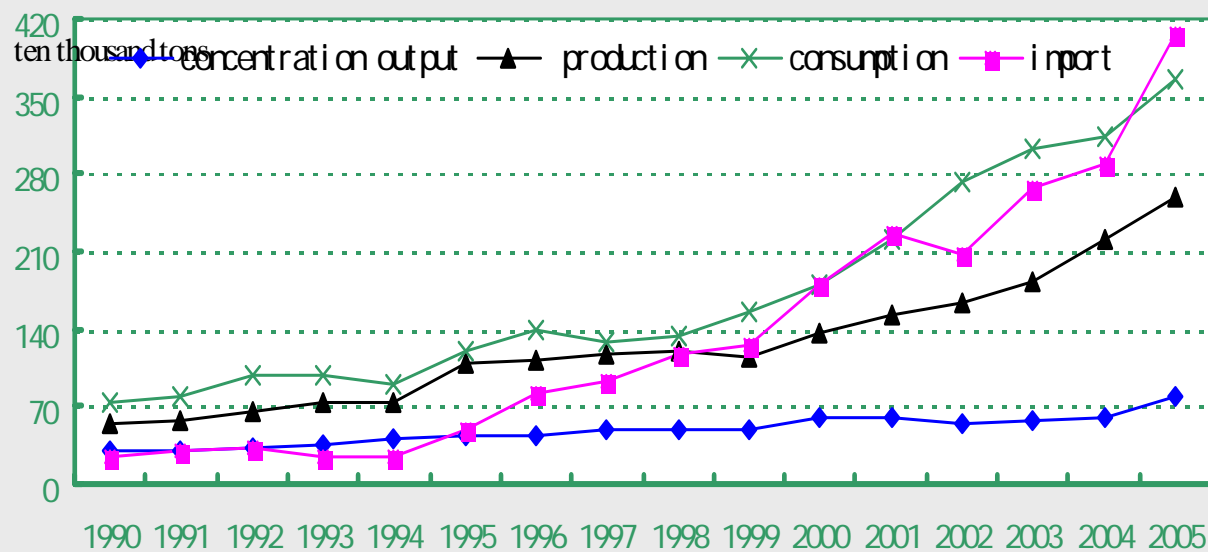
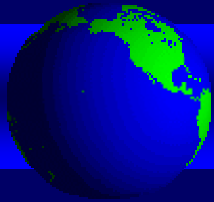
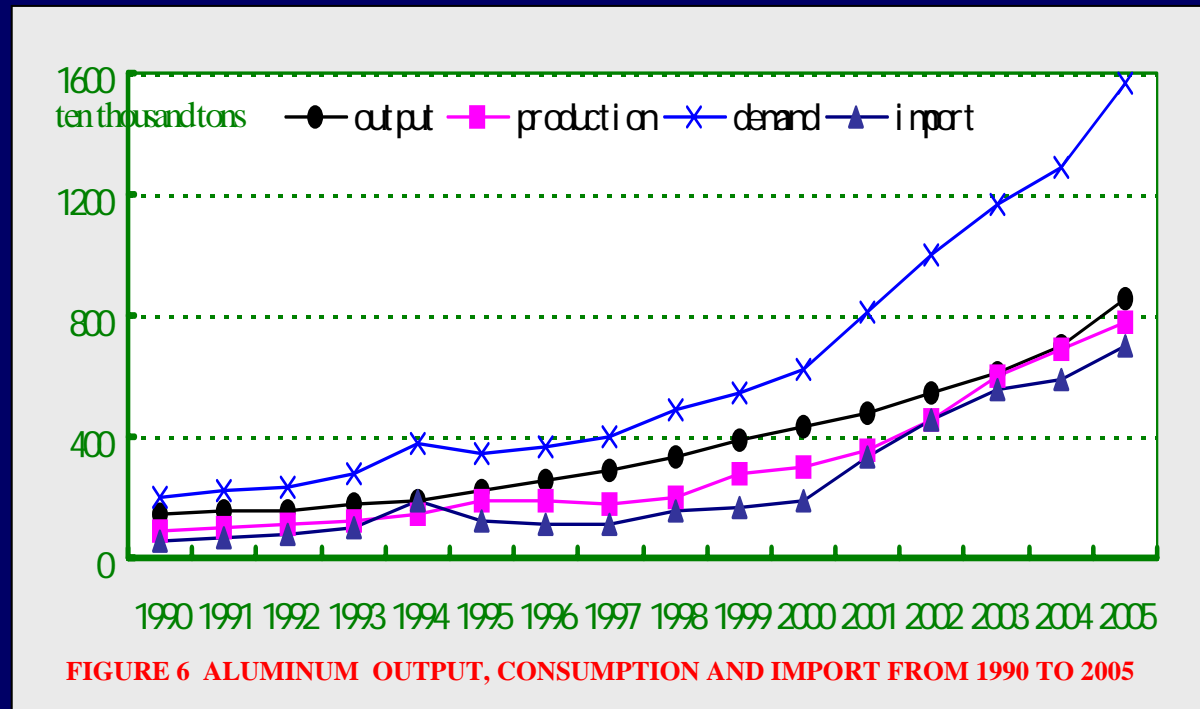


FIGURE 5 COPPER OUTPUT, CONSUMPTION AND IMPORT FROM 1990 TO 2005

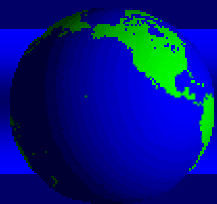


# MINERAL RESOURCES IN CHINA

The production of aluminum oxide in China was 8.609 million tons, and cathode aluminum 7.8 million tons. As the low grade of bauxite in China, 7.02 million tons of aluminum oxide imported in 2005 which about 45 % from other countries



## ALUMINUM



# MINERAL RESOURCES IN CHINA

## LEAD AND ZINC

The output of lead and zinc concentration in China in 2005 is 1.04 million tons and 2.52 million tons respectively. The import of lead and zinc concentration in 2005 is 1.03 million tons and 568,000 tons. China becomes an import country from export country in year of 2000

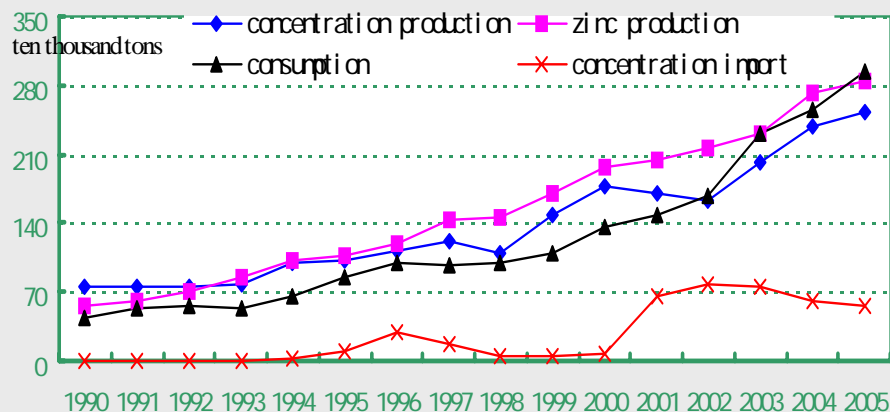


Figure 8 zinc output, consumption and import from 1990 to 2005

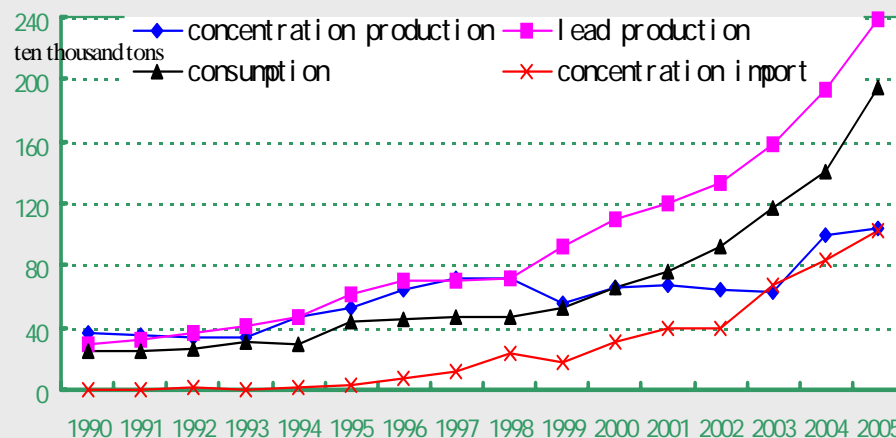
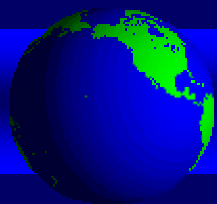


FIGURE 7 LEAD OUTPUT, CONSUMPTION AND IMPORT FROM 1990 TO 2005



# MINERAL RESOURCES IN CHINA

## RARE EARTH ELEMENTS

China is largest one in the world in the reserve, output and export of rare earth.

The output in 2005 is 103,000 tons, domestic consumption 51,900 tons, export 55,300 tons in 2005

The price of rare earth reduced due to 15.8% export increasing from year of 1990 to 2005

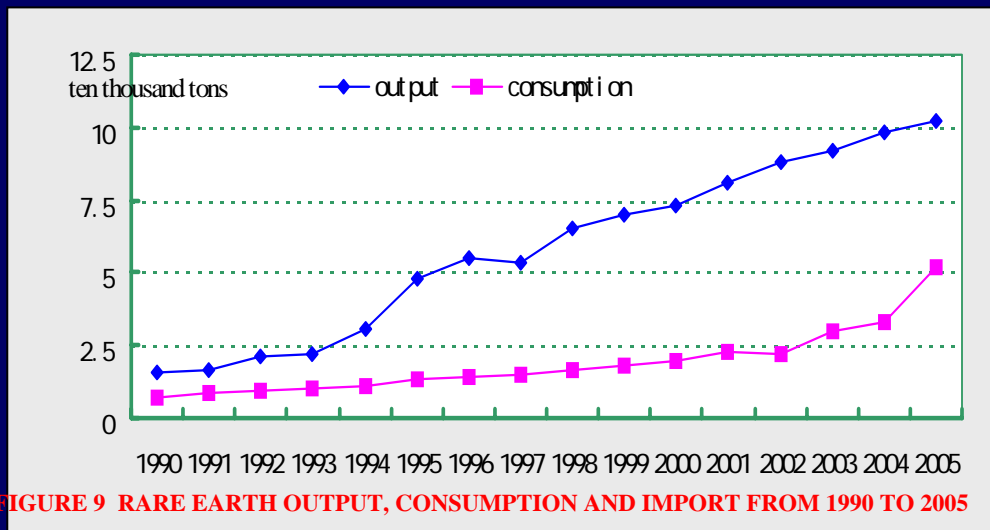


FIGURE 9 RARE EARTH OUTPUT, CONSUMPTION AND IMPORT FROM 1990 TO 2005

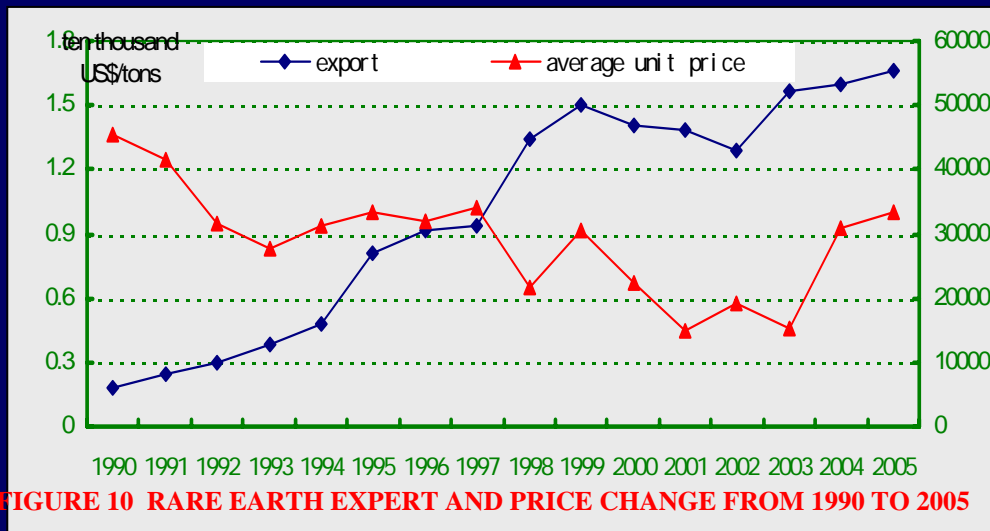
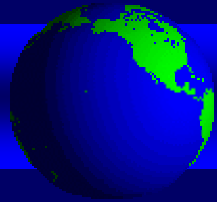


FIGURE 10 RARE EARTH EXPORT AND PRICE CHANGE FROM 1990 TO 2005



# *MINERAL RESOURCES IN CHINA*

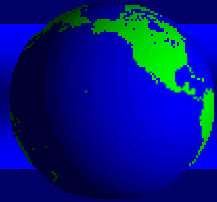
## **3. SITUATION OF METAL MINERALS OF CHINA**



### **PRINCIPAL**

The earth resource is not well distributed, global trade will be existed for long period. Mineral resources are still basic material base, they can not be replaced by any others even the period of knowledge economy is coming. Mineral resource is a dynamic concept, even the new minerals can be found, the traditional minerals will also be eliminated



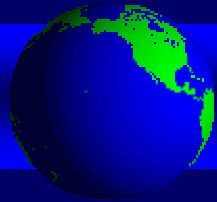


# MINERAL RESOURCES IN CHINA

## BASIC ESTIMATION

The situation of mineral resources is quite serious, main reasons:

- a) not enough reserve resources and low guaranty. Most minerals such as iron, manganese, copper, lead and zinc, cobalt, tin and gold can not meet the demands of year 2010, and one third of mines have not enough resources
- b) more small mines and less big mines, more poor mines and more difficult processing. Most of them are low grade and difficulty mining and high cost
- c) The recovery rate is low than 10-20% comparing with international level, about two third of them which are associated with other minerals have not been used comprehensively, the tailing only be used about 10%
- d) consumption is increasing rapidly, 168% of iron ores consumed from year 2000 to 2005 in China. Increasing 145% of manganese ores, copper, aluminum, lead, zinc, nickel, tungsten and rare earth are 90%, 103%, 194%, 109%, 249%, 94% and 169% respectively. It is estimated that before year 2010, the industry structure is still heavy and chemical industry, and still high demands to mineral resources



# MINERAL RESOURCES IN CHINA



## COUNTERMEASURES

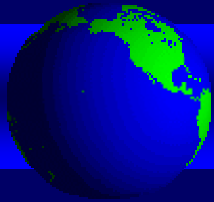
Strengthen the management, and reduce the waste and destroy of mineral resources; Increasing the recovery rate and comprehensive use by new technology

Putting more fund in mineral exploration of west part of China

Carrying out the exploration of deep and outside of old mines to increase the replace resources

Increasing the cycle use of minerals, petroleum and coal energy

Extending the international cooperation, and setting up the multi-channel import of resources and variety of mineral commodities



# MINERAL RESOURCES IN CHINA

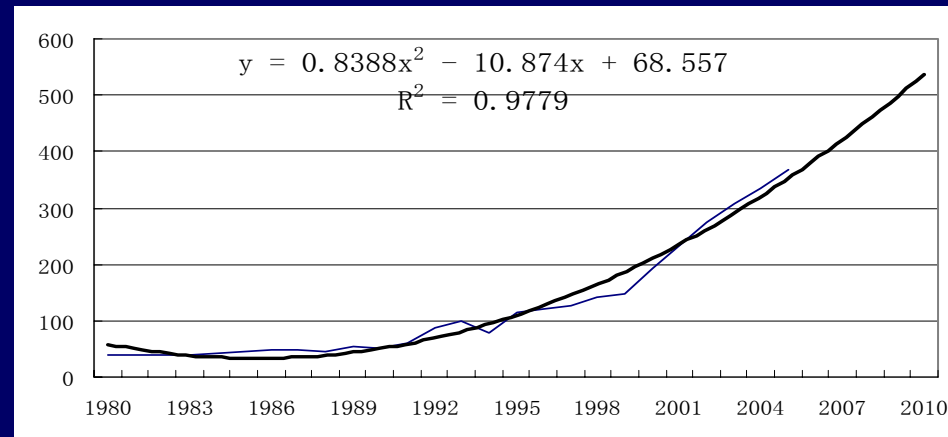


FIGURE 3 PREDICTION CURVE AND REGRESSION EQUATION OF COPPER

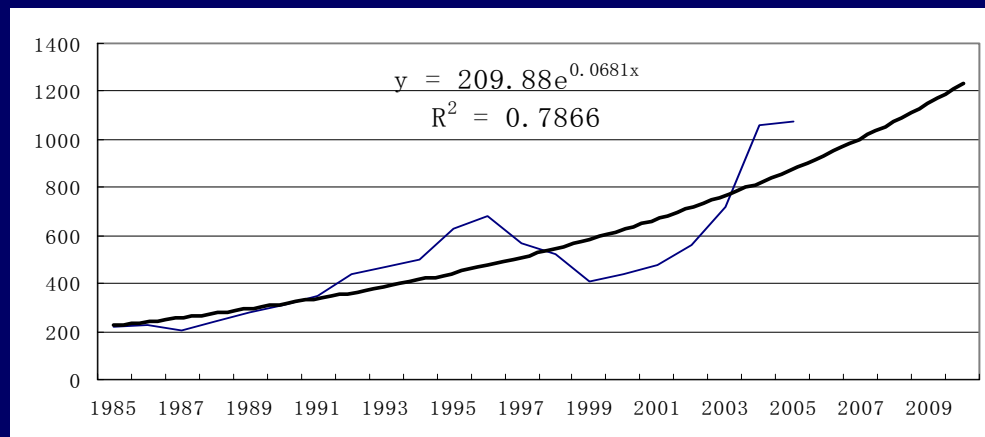
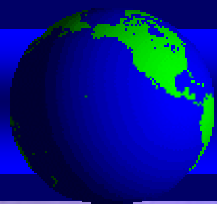


FIGURE 2 PREDICTION CURVE AND REGRESSION EQUATION OF MANGANESE ORES

**Annex**  
**Demand prediction**  
**of minerals to 2010**



# *MINERAL RESOURCES IN CHINA*

THANKS FOR YOUR ATTENTION!



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