An overview of geology for CO_2 Storage in China

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China Geological Survey

Jan 19th 2010

cags

China Australia Geological Storage of CO_2

中澳二氧化碳地质封存

Contents

1.Introduction

2.Geology of main basins in China

3.Suitable assessment of basins

4.Challenges

- Chinese government launched National Action Plan on Climate Change in June 2007.

- Chinese government also pledged “Carbon emission of per GDP will be reduced 40-45% in 2020 comparison to 2005” in 2009.

"Research on CO_2 Geological Storage in China(2009-2010)"project— Conducted by CGS

- The project aims to methodology research for geological exploration, storage capacity evaluation, geophysical exploration, monitoring, safety and economy evaluation of CO_2 Geological Storage; establish Chinese site evaluation and rank standards; Provide experiences for CO_2 Geological Storage in China.

To further enhance the capability of CO_2 Geological storage, CGS draw the program "strategy for CO_2 Geological Storage (2010-2020)"

Strategy Objections:

1.Thoeretical capacity evaluation

2.Basins assessment

3.Sites assessment

4.Project Practice

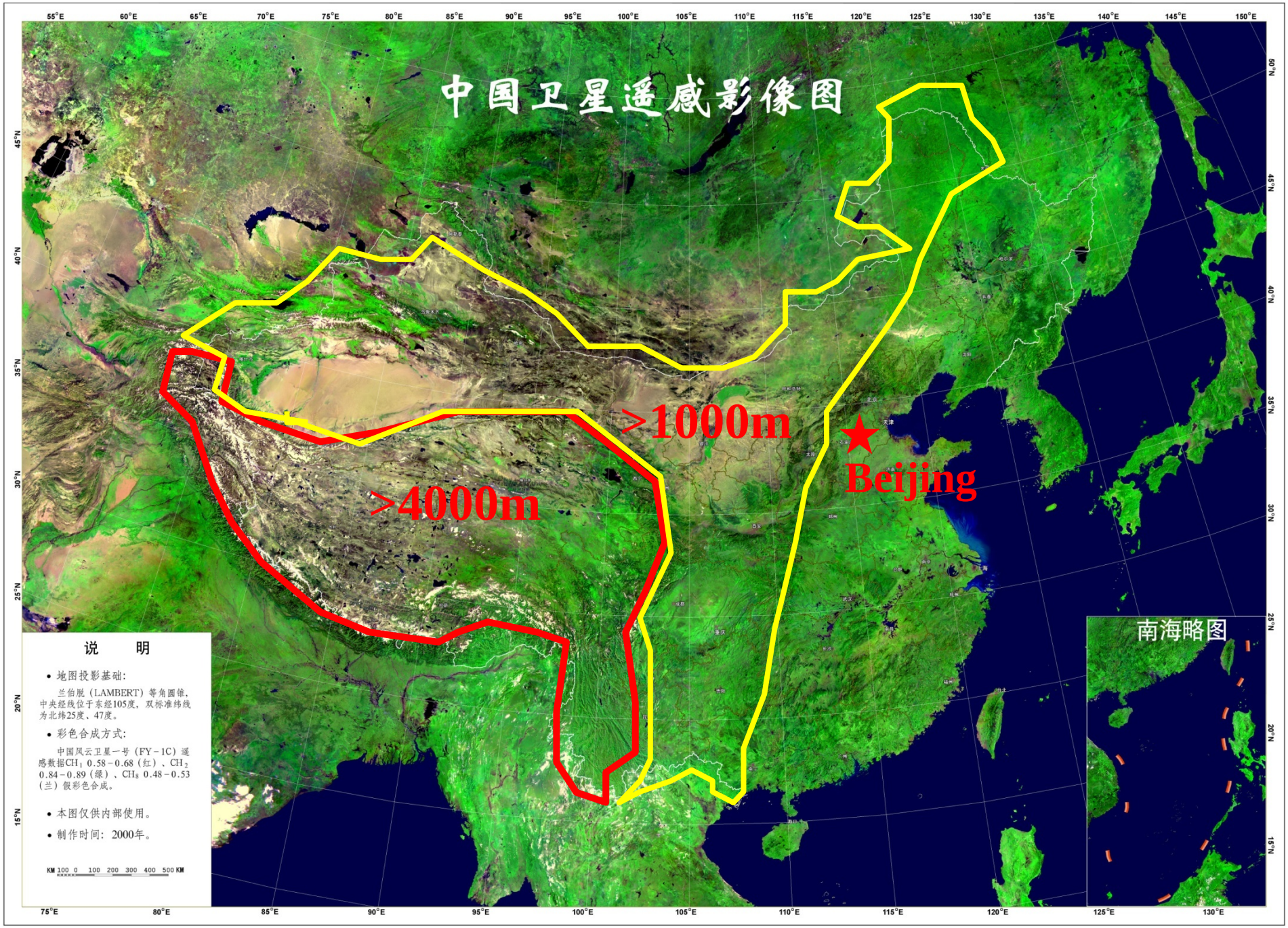
Contents

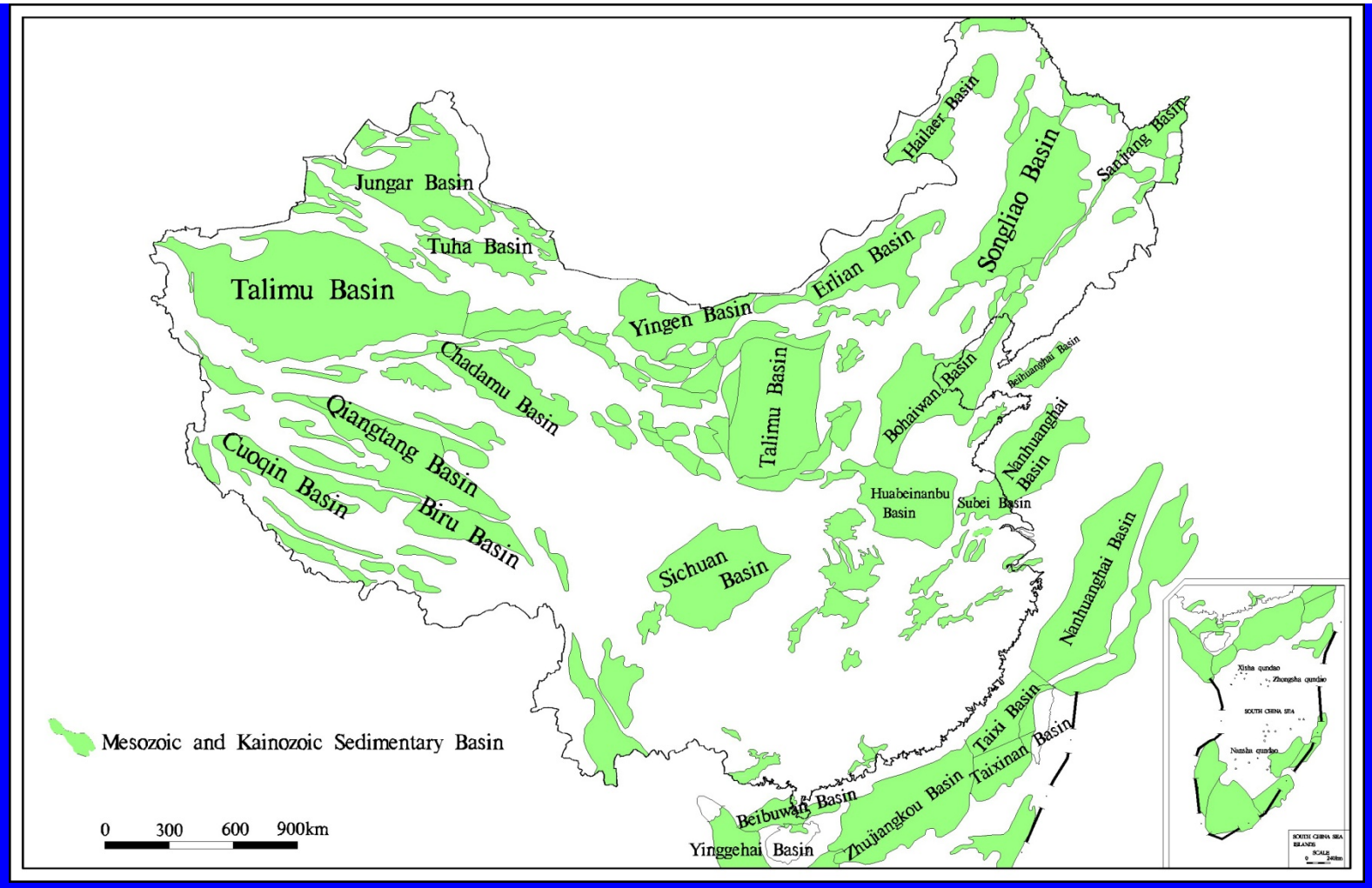
1.Introduction

2.Geology of main basins in China

3.Suitable assessment of basins

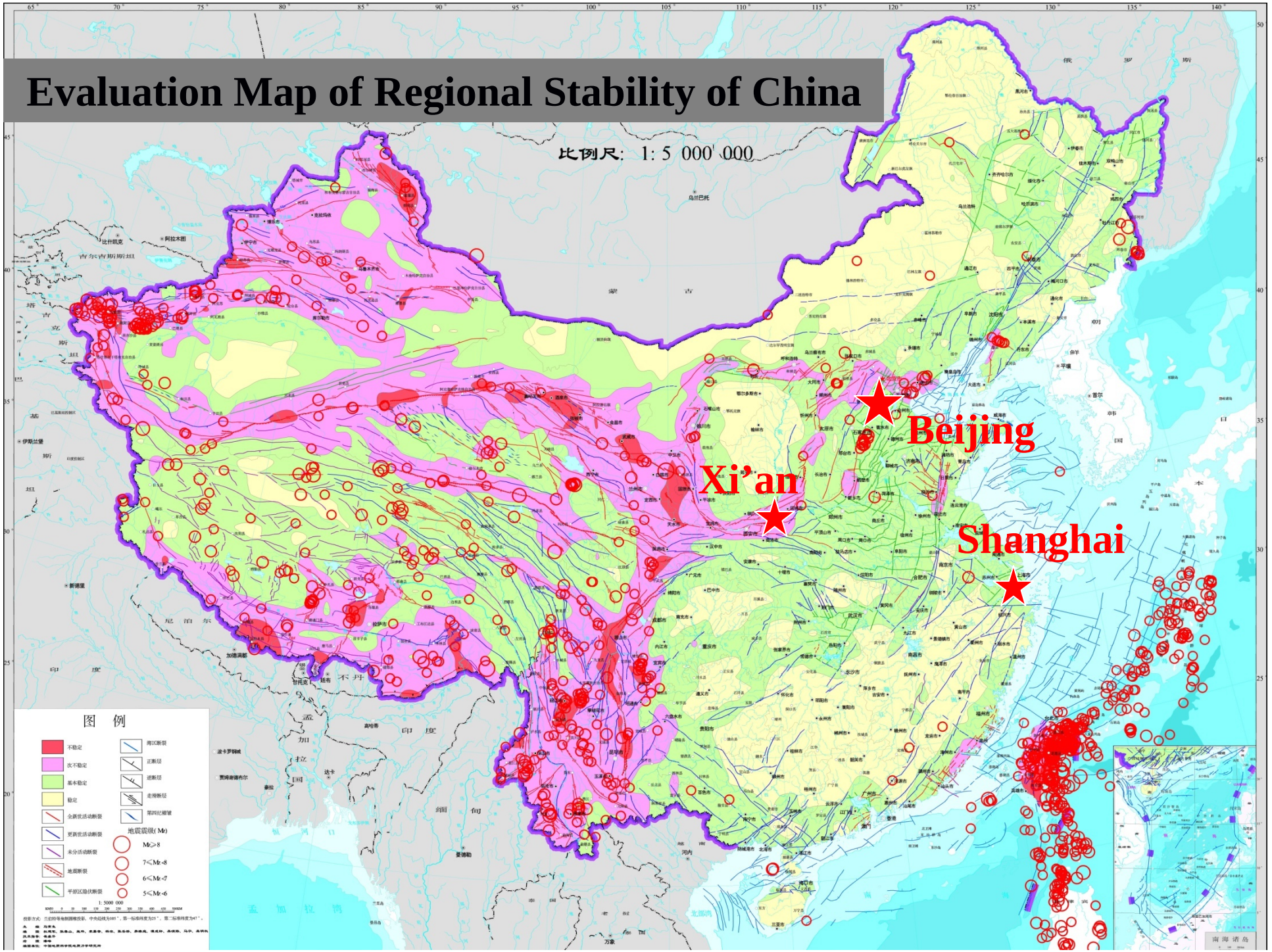
4.Challenges

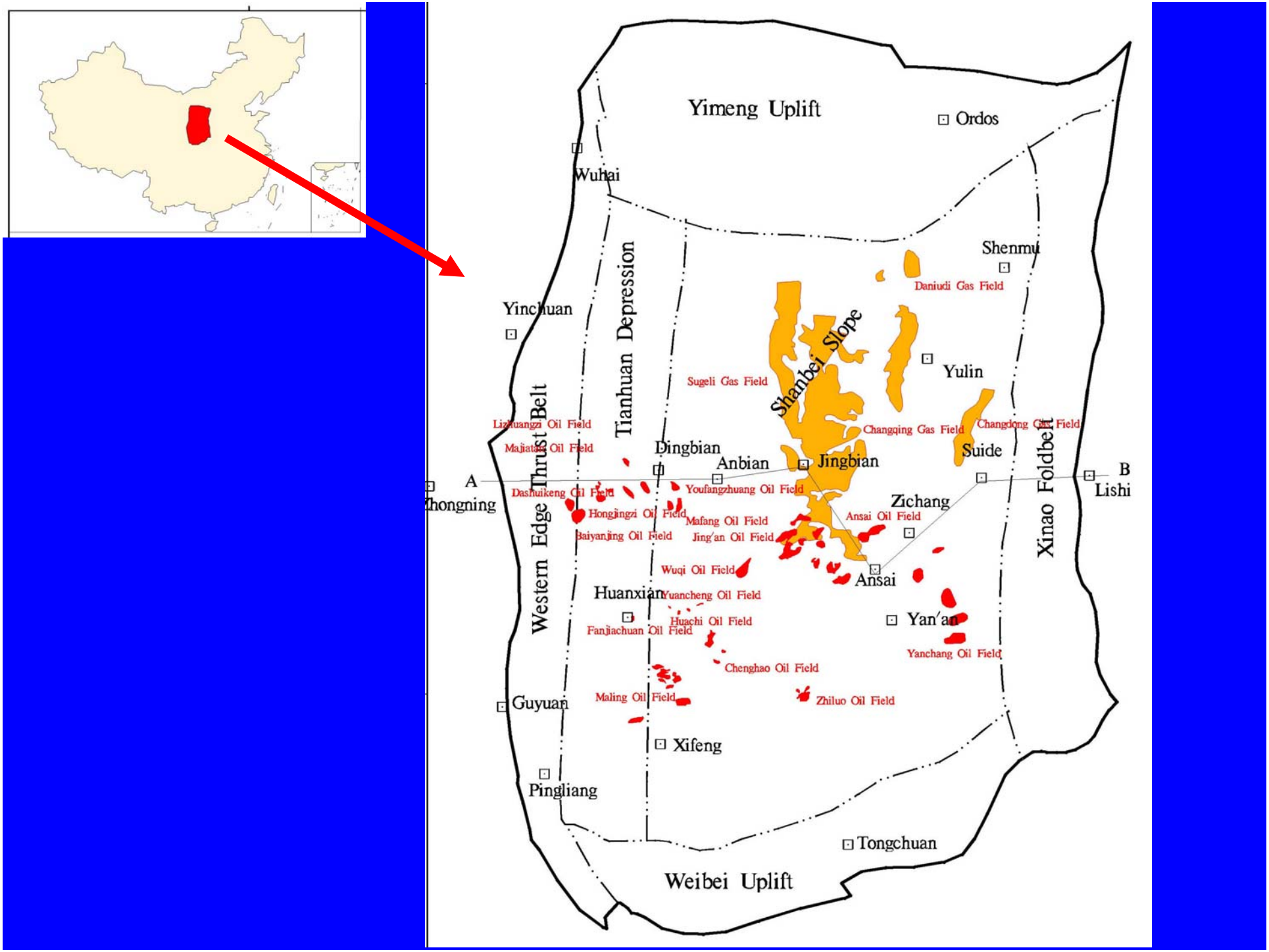

中国卫星遥感影像图
>1000m
>4000m
Beijing
南海略图
说　明
• 地图投影基础:
兰伯脱（LAMBERT）等角圆锥，中央经线位于东经105度，双标准纬线为北纬25度、47度。
• 彩色合成方式:
中国风云卫星一号（FY－1C）遥感数据CH1 0.58－0.68（红）、CH2 0.84－0.89（绿）、CH8 0.48－0.53（兰）假彩色合成。
• 本图仅供内部使用。
• 制作时间：2000年。
KM 100 0 100 200 300 400 500 KM



In China, There are totally more than 417 Basins with more than 200km^2; the 417 basins cover more than 5.7million km^2, including 27 offshore basins; 50 basins are hopeful for CO_2 Storage.

Evaluation Map of Regional Stability of China




Yimeng Uplift
Ordos
Wuhai
Shenmu
Daniudi Gas Field
Yinchuan
Tianhuan Depression
Shanbei Slope
Yulin
Sugeli Gas Field
Western Edge Thrust Belt
Liguangzi Oil Field
Majiatan Oil Field
Changqing Gas Field
Changqing Oil Field
Dingbian
Anbian
Jingbian
Suide
Xinao Foldbelt
A
B
Lishi
Zhongning
Dashuikeng Oil Field
Youfangzhuang Oil Field
Zichang
Hongjingzi Oil Field
Mafang Oil Field
Ansai Oil Field
Baiyanjing Oil Field
Jing'an Oil Field
Wuqi Oil Field
Ansai
Huanxian
Yuancheng Oil Field
Yan'an
Huachi Oil Field
Fanjiachuan Oil Field
Yanchang Oil Field
Chenghao Oil Field
Maling Oil Field
Zhiluo Oil Field
Guyuan
Xifeng
Pingliang
Tongchuan
Weibei Uplift

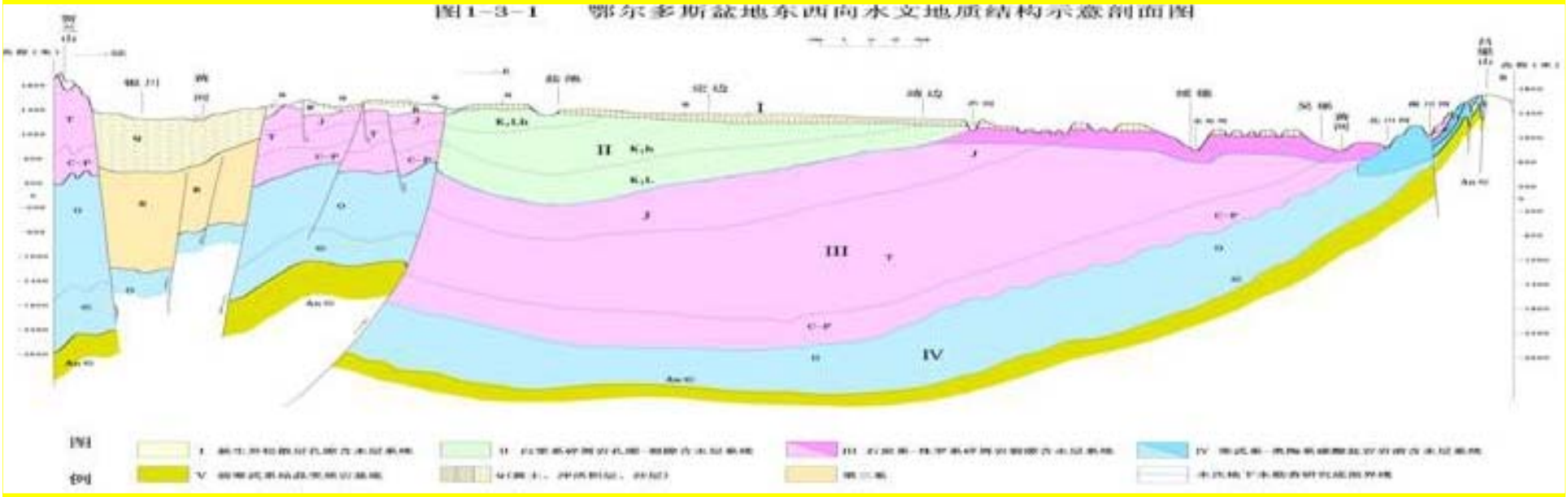
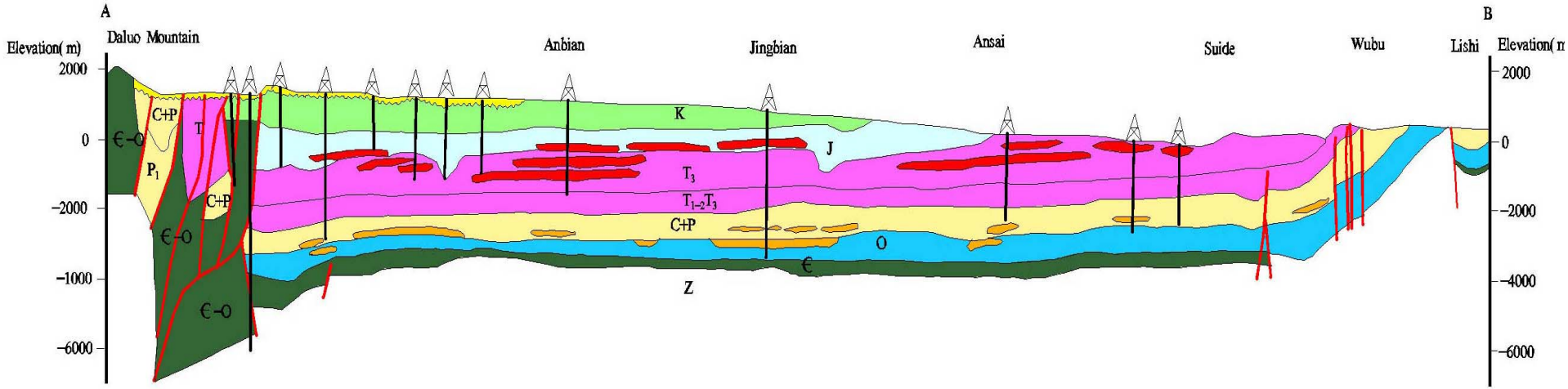
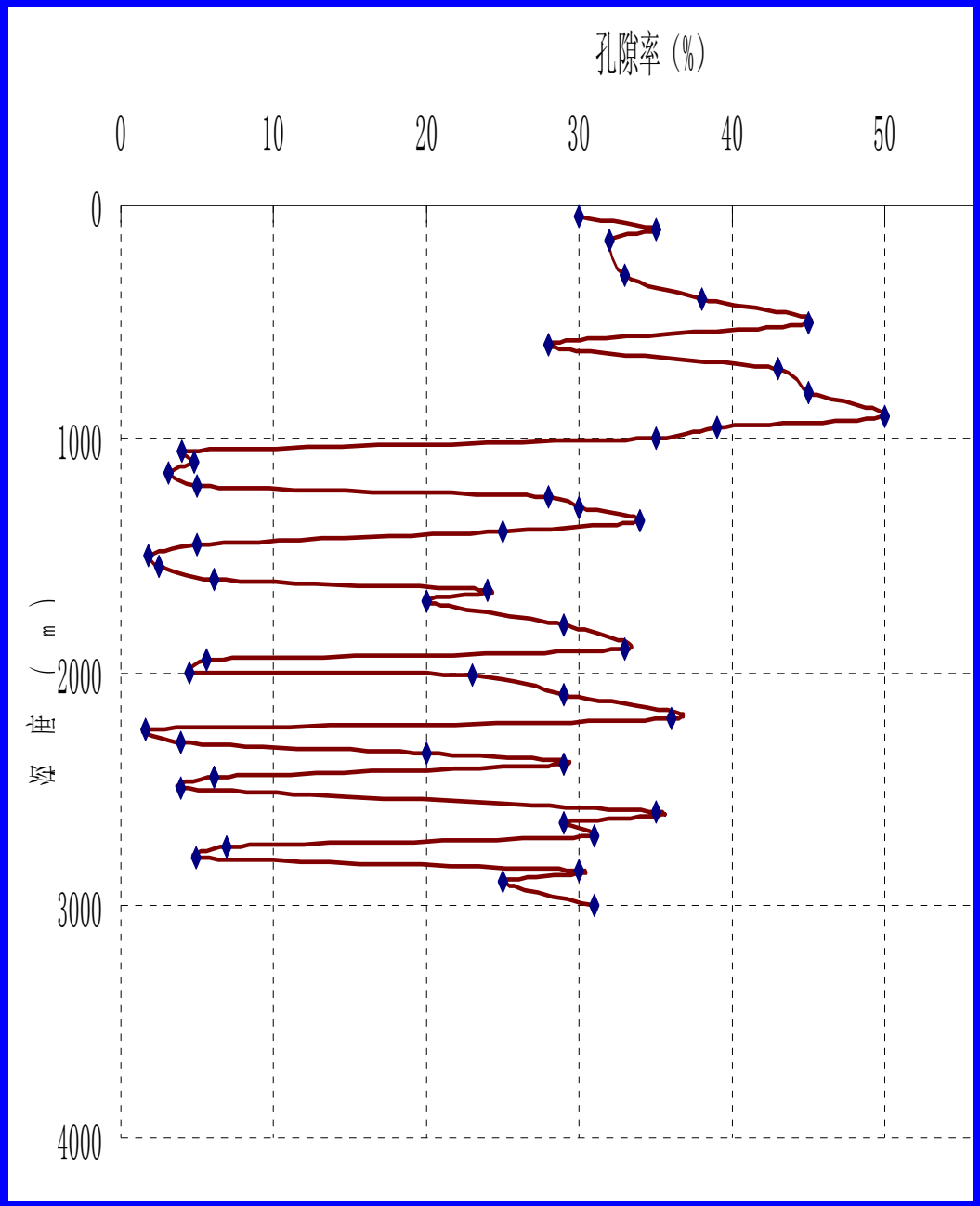
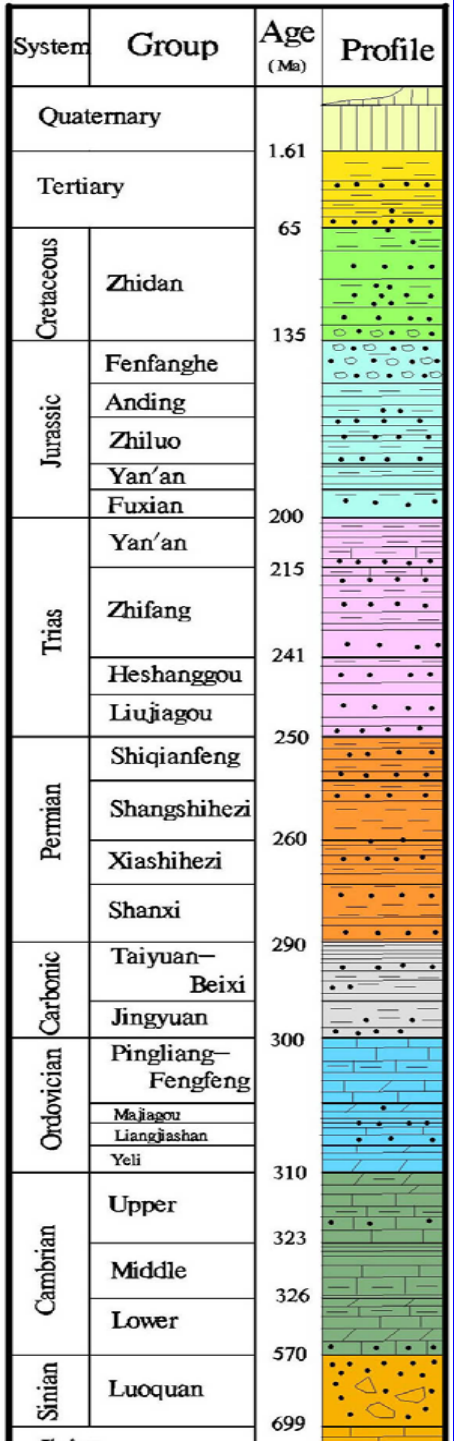


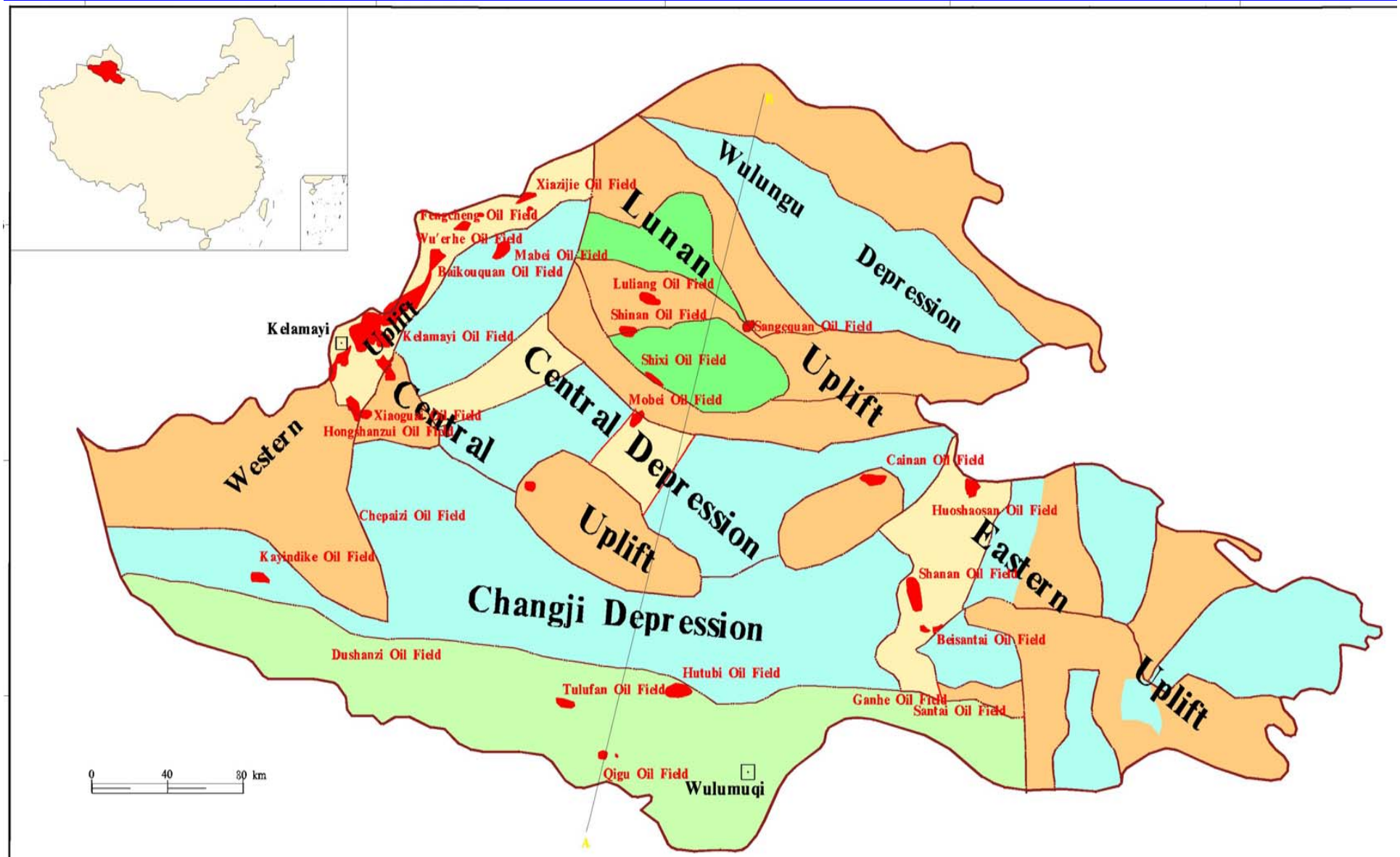
图1-3-1 鄂尔多斯盆地东西向水文地质结构示意剖面图
II
III
IV


A
B
Elevation(m)
Daluo Mountain
Anbian
Jingbian
Ansai
Suide
Wubu
Lishi
Elevation(m)
2000
0
−2000
−1000
−6000
−4000
C+P
T
P1
K
J
T3
T1-2T3
O
Z



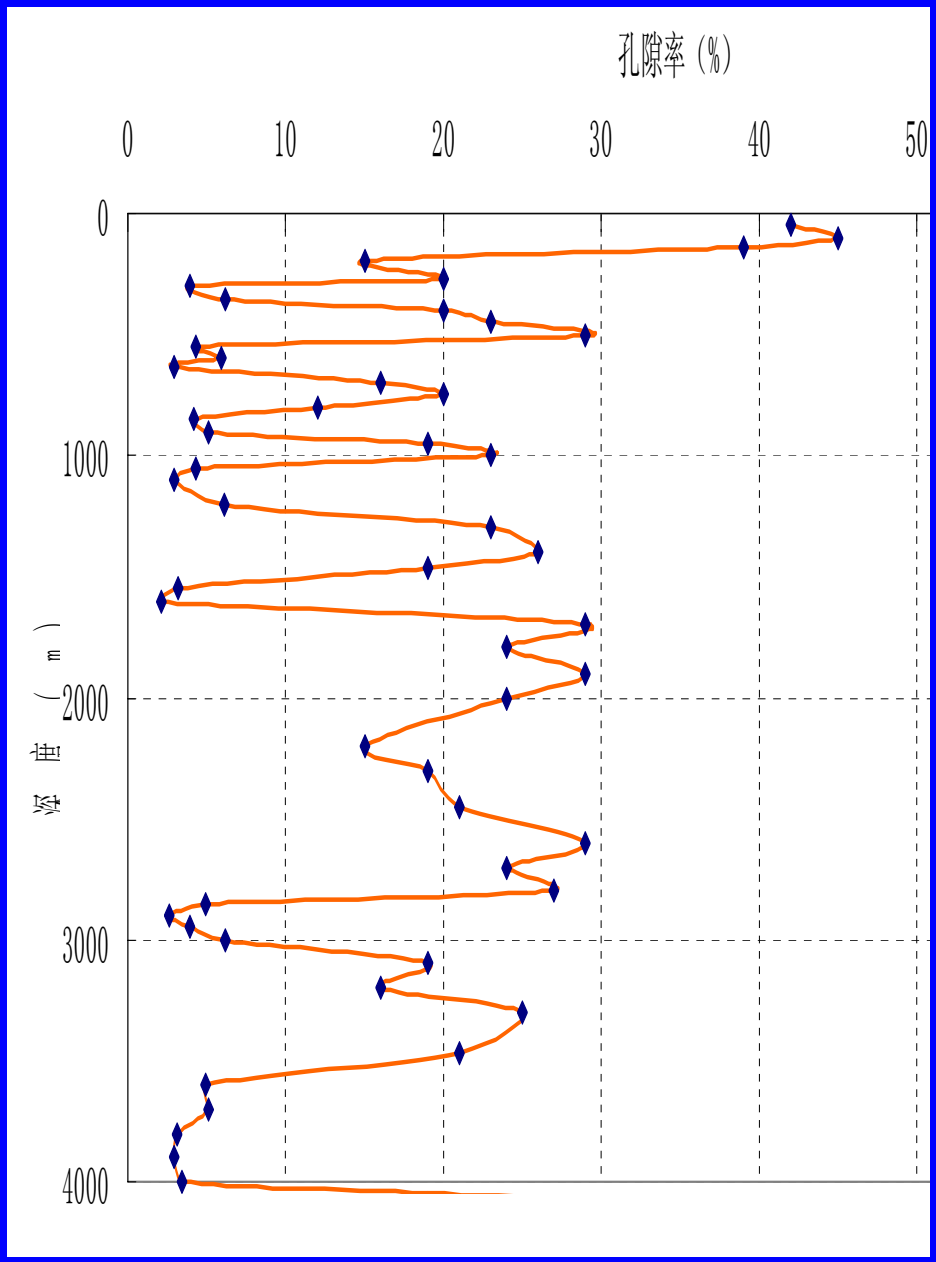


Curve between porosity and depth in Ordos Basin

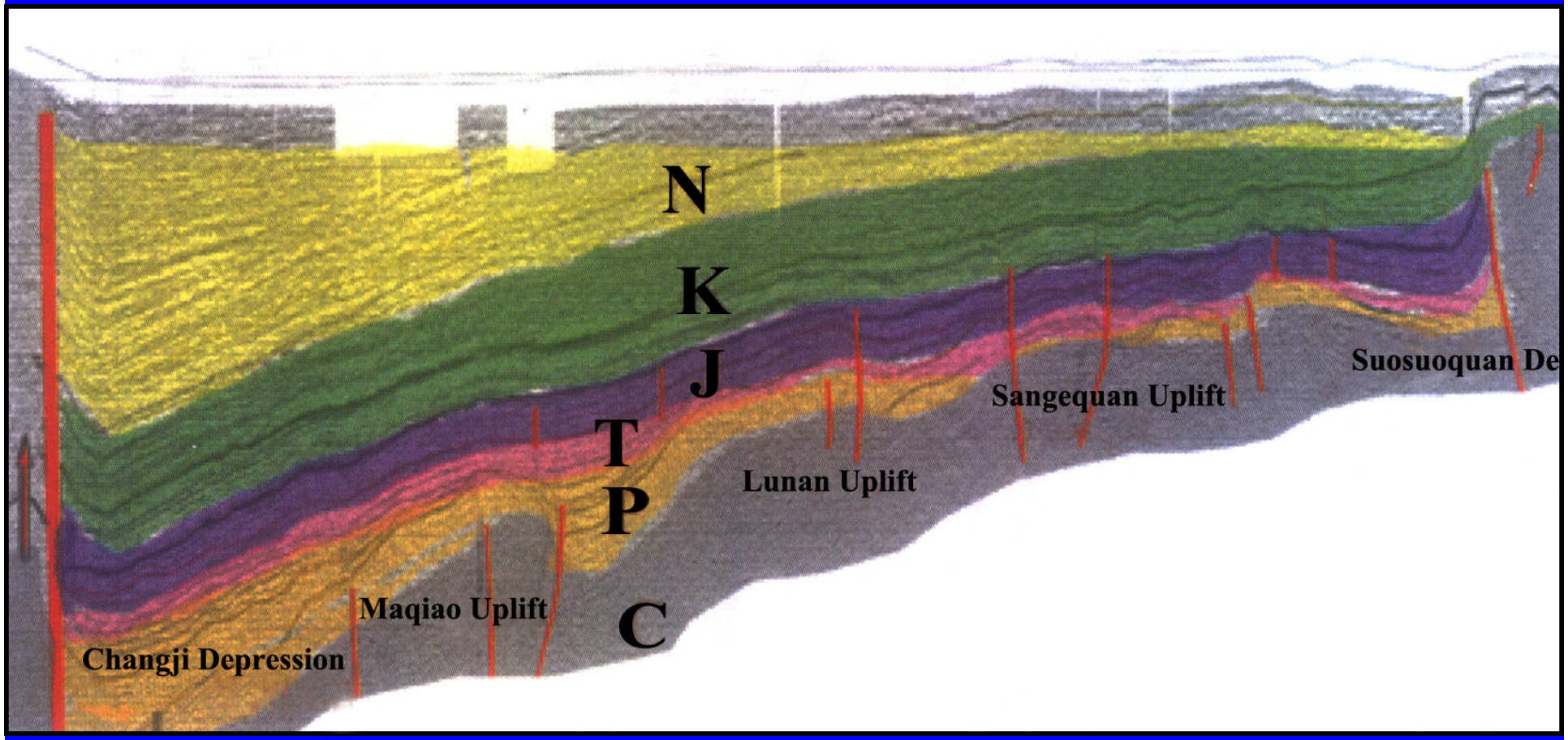


Location map of Zunggar Basin

地层	层底深度	厚度	柱状图	岩性
N	136	136		泥岩
K	268.6	132.6		砂岩
J	350	81.4		泥岩
	500	150		砂砾岩
	632.6	132.6		泥岩
	800	167.4		砂岩
	900	100		泥岩
	1000	100		砂岩
	1200	200		泥岩
	1465.6	265.6		砂岩
T	1600	134.4		泥岩
	1785.6	185.6		砂岩
	2435.6	650		砂砾岩
P	2800	364.4		砂砾岩
	3000	200		泥岩
	3473.6	473.6		砂砾岩
	4000	526.4		泥岩
	4200	200		砂岩
	4352.4	152.4		泥岩

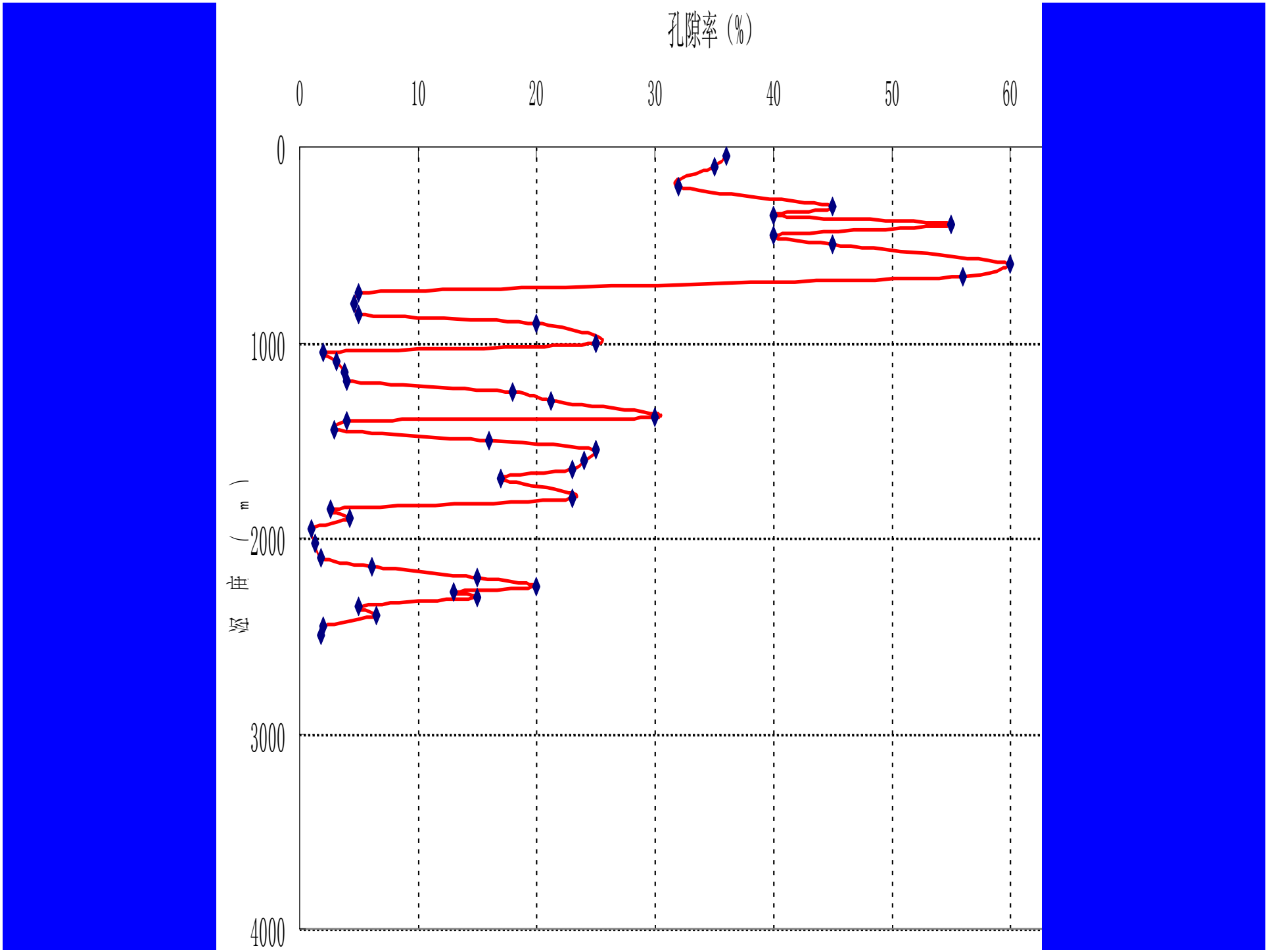


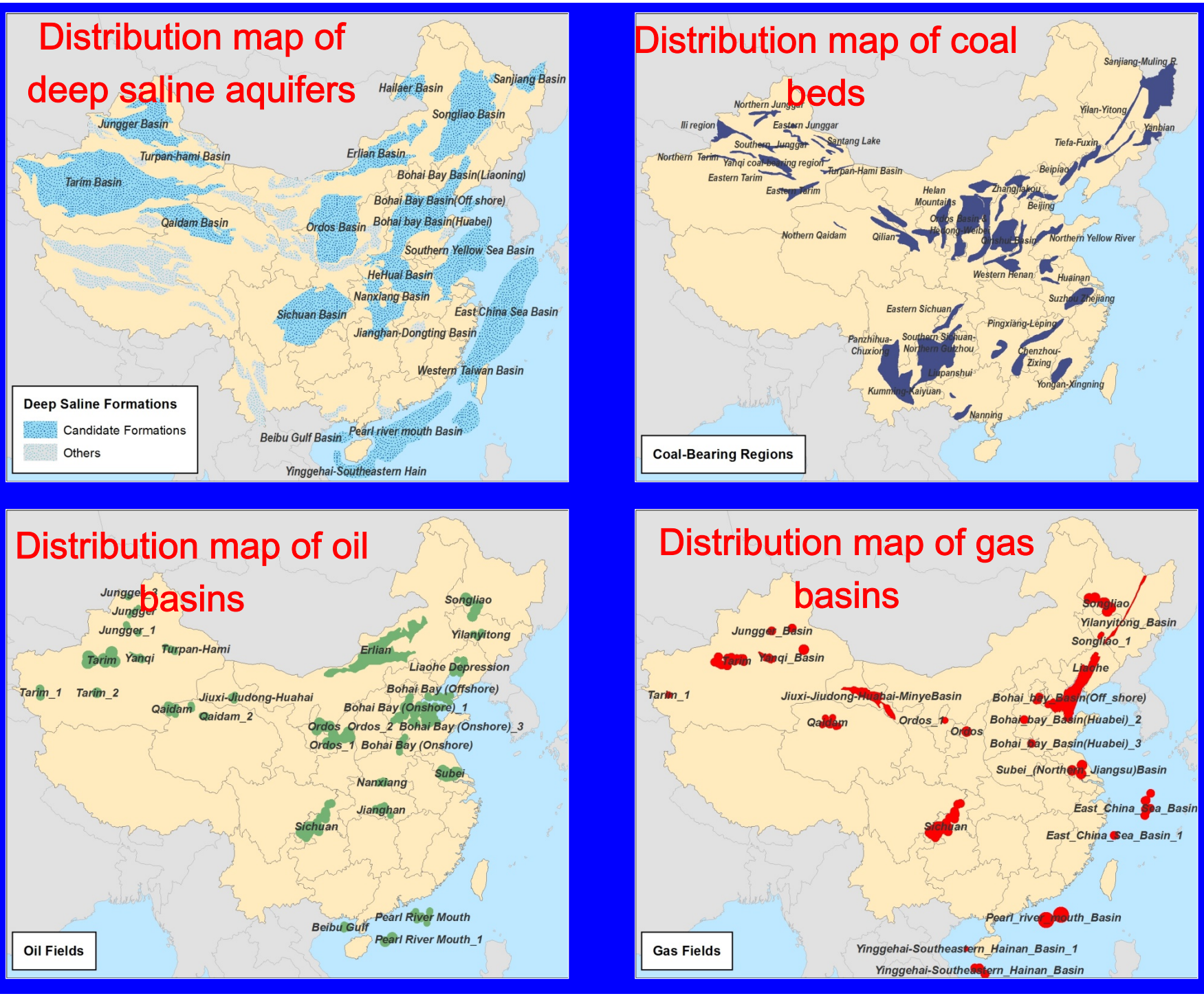
Curve between porosity and depth in Zunggar Basin

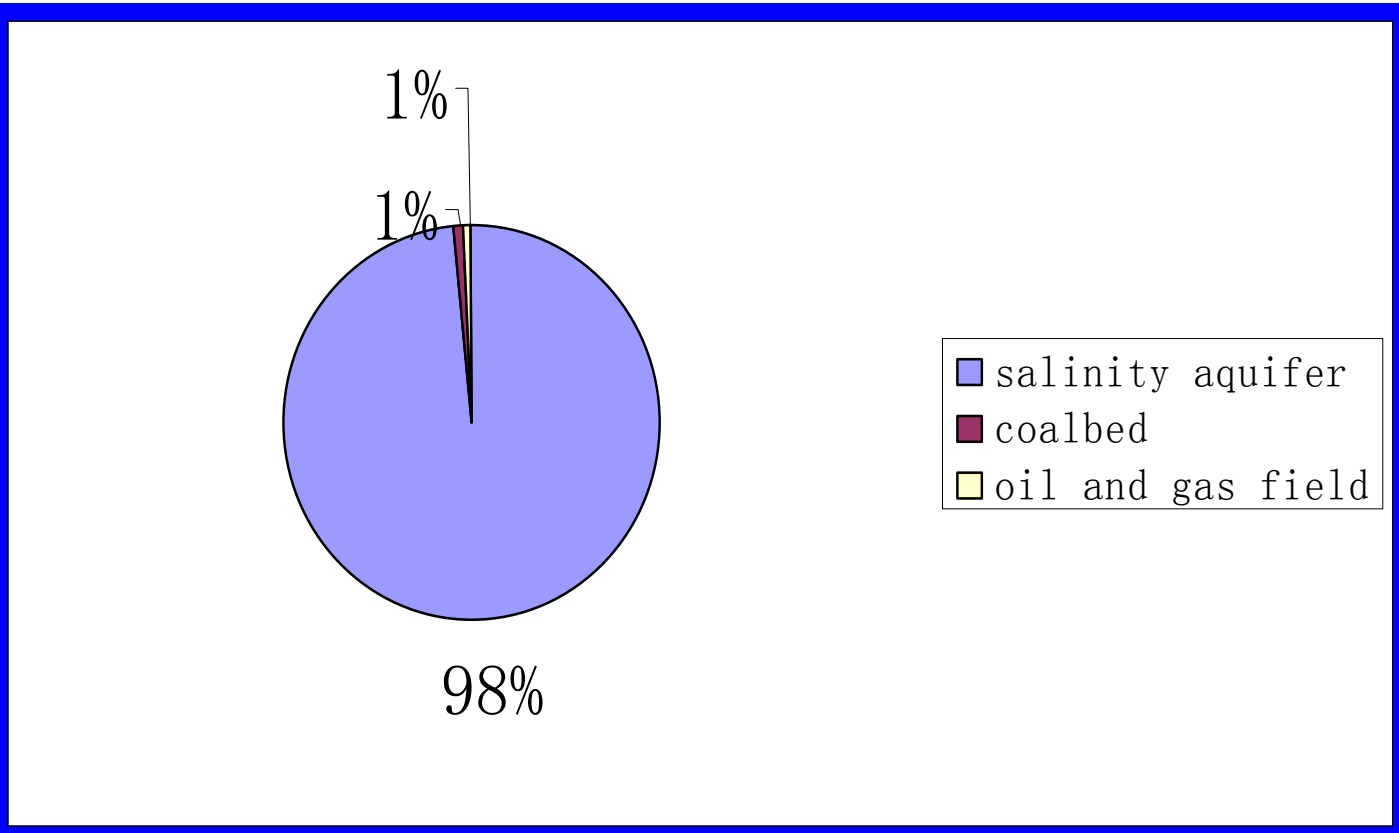


Seismic profiles from South to North

地层代号	层底深度(m)	厚度(m)	岩性柱状图	岩　性
Q	660.0	660.0		砂
				粘土
				砂
R	1795.5	1135.5		泥岩
				砾砂岩
				泥岩
				砾砂岩
				泥岩
				砂岩
				角砾岩
0	2178.0	382.5		灰岩
				白云岩
€	2384.0	206.0		白云岩
	2500.0	116.0		白云质灰岩


孔隙率（%）
0
10
20
30
40
50
60
0
1000
2000
3000
4000
深度（m）


Distribution map of deep saline aquifers
Hailaer Basin
Sanjiang Basin
Songliao Basin
Jungger Basin
Turpan-hami Basin
Erlian Basin
Tarim Basin
Bohai Bay Basin(Liaoning)
Bohai Bay Basin(Off shore)
Qaidam Basin
Ordos Basin
Bohai bay Basin(Huabei)
Southern Yellow Sea Basin
HeHuai Basin
Nanxiang Basin
Sichuan Basin
East China Sea Basin
Jianghan-Dongting Basin
Western Taiwan Basin
Deep Saline Formations
Candidate Formations
Others
Beibu Gulf Basin
Pearl river mouth Basin
Yinggehai-Southeastern Hain
Distribution map of coal beds
Sanjiang-Muling P.
Northern Junggar
Ili region
Eastern Junggar
Yilan-Yitong
Yanbian
Santang Lake
Southern Junggar
Tiefa-Fuxin
Northern Tarim
Yanqi coal-bearing region
Turpan-Hami Basin
Beipiao
Eastern Tarim
Helan Mountains
Zhangjiakou
Beijing
Ordos Basin & Hedong-Weibei
Nothern Qaidam
Qilian
Qinshui Basin
Northern Yellow River
Western Henan
Huainan
Suzhou Zhejiang
Eastern Sichuan
Pingxiang-Leping
Panzhihua-Chuxiong
Southern Sichuan-Northern Guizhou
Chenzhou-Zixing
Liupanshui
Yongan-Xingning
Kunming Kaiyuan
Nanning
Coal-Bearing Regions
Distribution map of oil basins
Songliao
Yilanyitong
Erlian
Liaohe Depression
Tarim_1
Tarim_2
Jiuxi-Jiudong-Huahai
Bohai Bay (Offshore)
Qaidam
Qaidam_2
Bohai Bay (Onshore)_1
Ordos
Ordos_2
Bohai Bay (Onshore)_3
Ordos_1
Bohai Bay (Onshore)
Subei
Nanxiang
Jianghan
Sichuan
Pearl River Mouth
Beibu Gulf
Pearl River Mouth_1
Oil Fields
Distribution map of gas basins
Songliao
Yilanyitong_Basin
Songliao_1
Liaohe
Tarim_1
Jiuxi-Jiudong-Huabai-MinyeBasin
Bohai_bay_Basin(Off_shore)
Qaidam
Ordos_1
Ordos
Bohai_bay_Basin(Huabei)_2
Bohai_bay_Basin(Huabei)_3
Subei_(North_Jiangsu)Basin
East_China_Sea_Basin
Sichuan
East_China_Sea_Basin_1
Pearl_river_Mouth_Basin
Yinggehai-Southeastern_Hainan_Basin_1
Yinggehai-Southeastern_Hainan_Basin
Gas Fields



Totally CO_2 storage capacity of three types in China: 1455 billion tons.

- Deep Saline Formations(24 Basins): 1435 billion tons.
- Coal Bearing region(68 coal areas): 12 billion tons.
- Oil and gas fields (46 basins): 8 billion tons.

Contents

1.Introduction

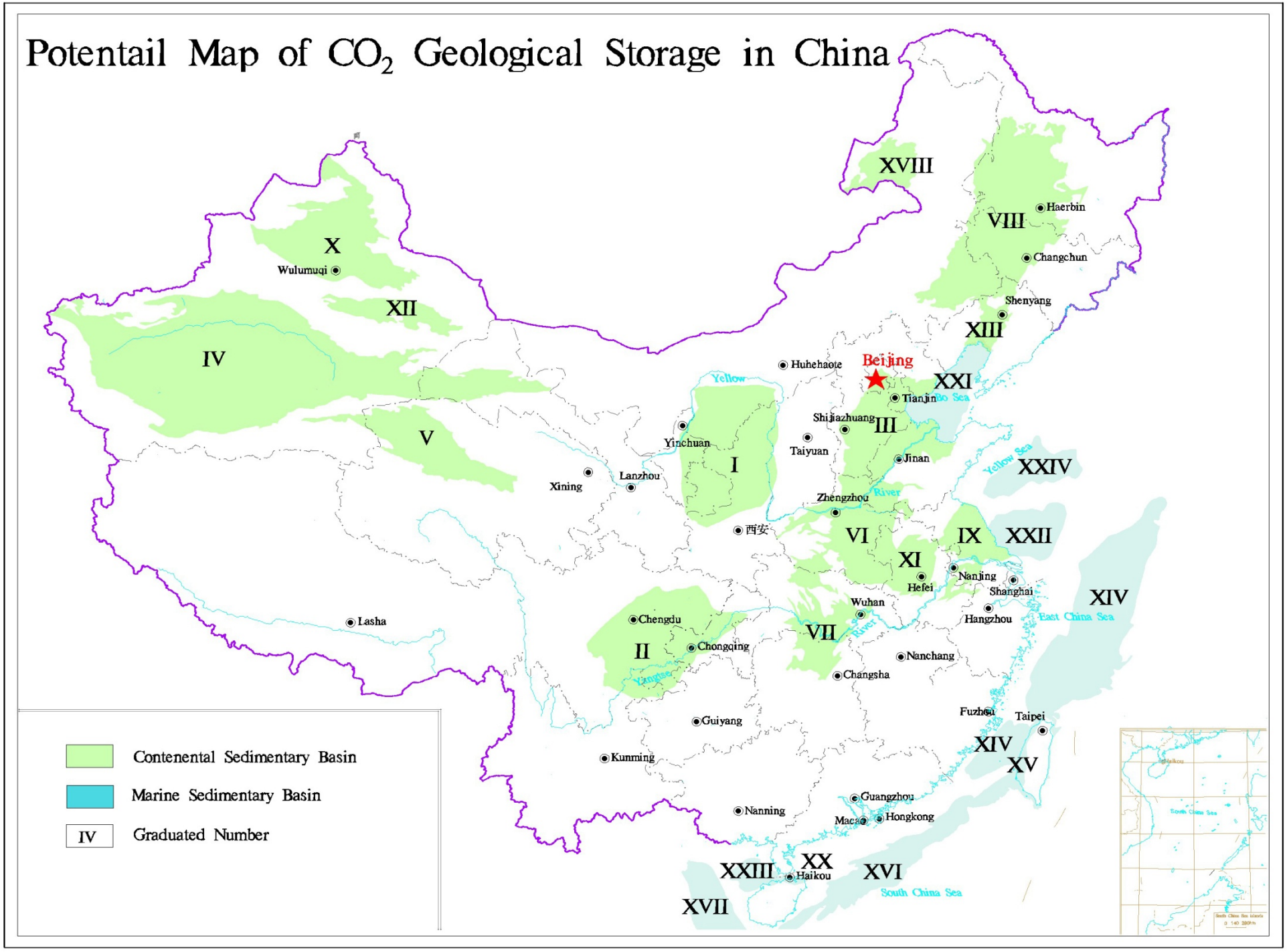
2.Geology of main basins in China

3.Suitable assessment of basins

4.Challenges

The suitable basins for CO_2 geological storage

Basin	Area* ($10^4 km^2$)	Maximum Thickness(m)	Stability**	Storage Capacity(Gt)
Tarim	59.19	>14000	r	2793.37
North China plain	18.58	>6000	r	810.26
Ordos	20.35	>4000	s	760.01
Songliao	27.11	>6000	s	449.71
Pearl River Mouth	8.30	>10000	r	2372.78
East China Sea	27.13	>10000	r	1849.59
Sichuan	18.49	>9000	r	649.96
Qaidam	10.23	>17000	r	1097.40
Zunggar	15.64	>16000	r	475.97


Potentail Map of CO_2 Geological Storage in China
XVIII
VIII
Haerbin
Changchun
Shenyang
X
Wulumuqi
XII
XIII
IV
Huhehaote
Beijing
XXI
Tianjin
Bo Sea
Yellow
Shijiazhuang
III
V
Yinchuan
Taiyuan
Jinan
I
Yellow Sea
XXIV
Xining
Lanzhou
Zhengzhou
River
西安
VI
IX
XXII
XI
Nanjing
Hefei
Shanghai
XIV
Wuhan
Hangzhou
East China Sea
Lasha
Chengdu
VII
River
II
Chongqing
Nanchang
Changsha
Yangtse
Fuzhou
Taipei
Guiyang
XIV
XV
Kunming
Guangzhou
Nanning
Macao
Hongkong
XXIII
XX
Haikou
XVI
South China Sea
XVII
Contenental Sedimentary Basin
Marine Sedimentary Basin
IV
Graduated Number

Contents

1.Introduction

2.Geology of main basins in China

3.Suitable assessment of basins

4.Challenges

1. Data Share and multi-department cooperation
2. Capacity building for CO_2 geological storage in China
3. Key techniques research
4. International cooperation

Thank you for your attention!