

Soil database of China and carbon dynamics at regional scale

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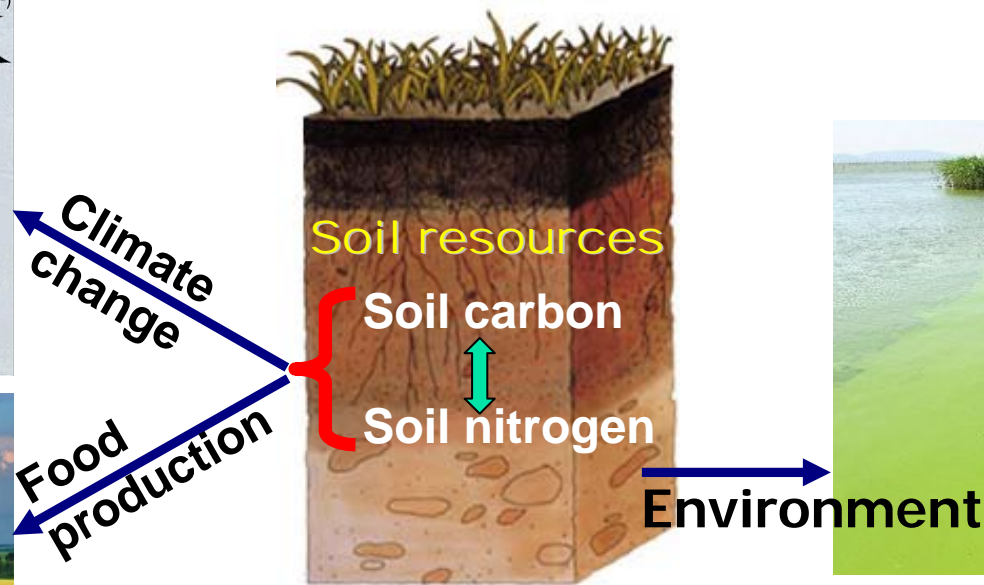
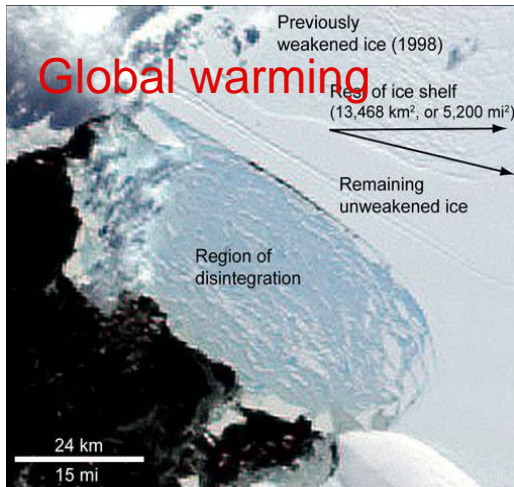




Outline

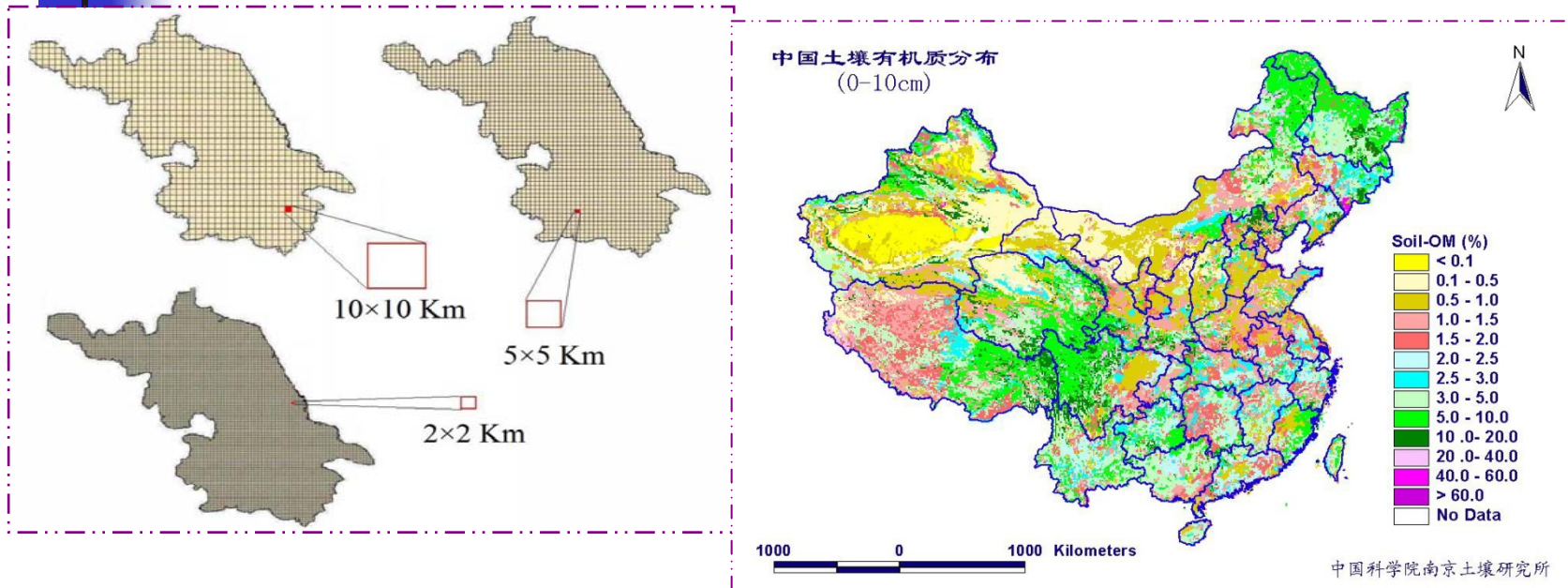
- ◆ **Role of soil database**
- ◆ **Multiple digital soil maps of China**
- ◆ **Soil attribute database of China**
- ◆ **Soil reference system of China**
- ◆ **SOC storage of China**
- ◆ **Scale effect of SOC estimates at regional scale**

Role of Soil Database



Urgent needs of digital soil database of China at multiple scale

What kinds of soil data we need?



Regional soil attribute data

- ◆ Soil attribute: Clay content, soil pH and soil organic matter, etc.
- ◆ Soil depth: 0-20, 20-30, 30-70 and >70 cm
- ◆ Multiple scales: e.g., 1:1,000,000 and 1:50,000 vector data
10*10 km, 2*2 km and 100*100 m raster data

Digital Soil Maps of China

Soil Map

Whole regions

National scale: 1:14,000,000

National scale: 1:4,000,000

National scale: 1:1,000,000

Provincial scale: 1:500,000

Part region

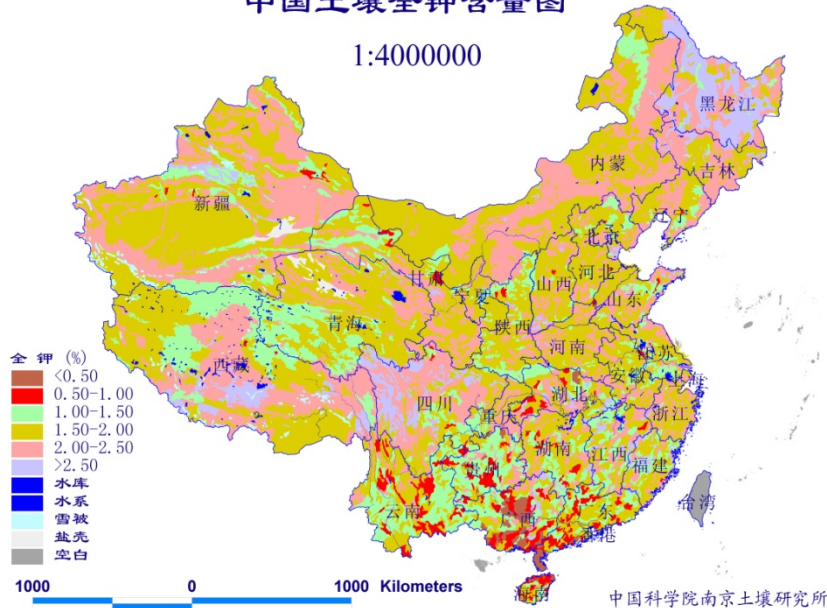
City scale: 1:200,000

County scale: 1:50,000

Digital soil map of 1:4,000,000/1:1,000,000

中国土壤全钾含量图

1:4000000

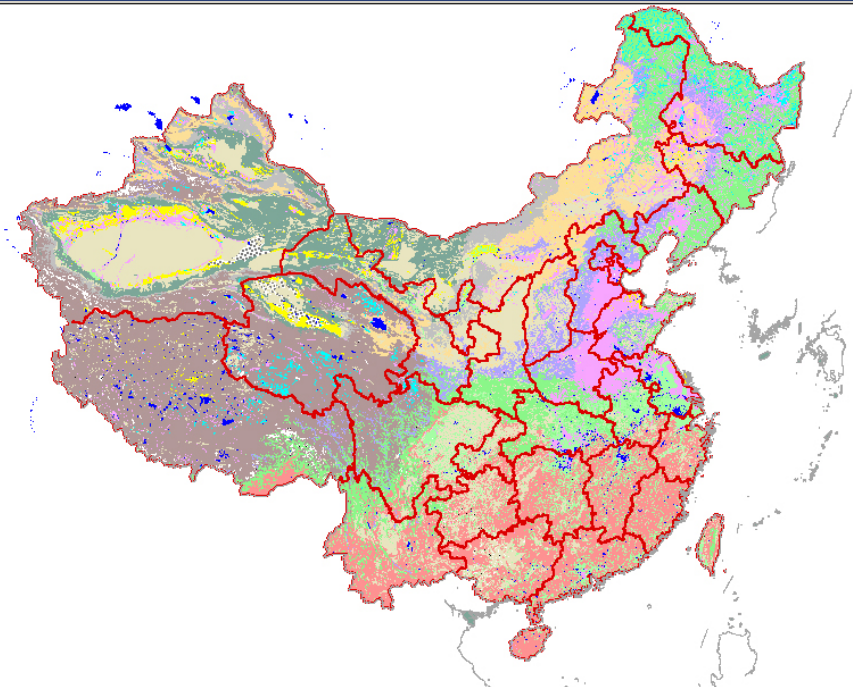


1:4,000,000 digital soil map of China

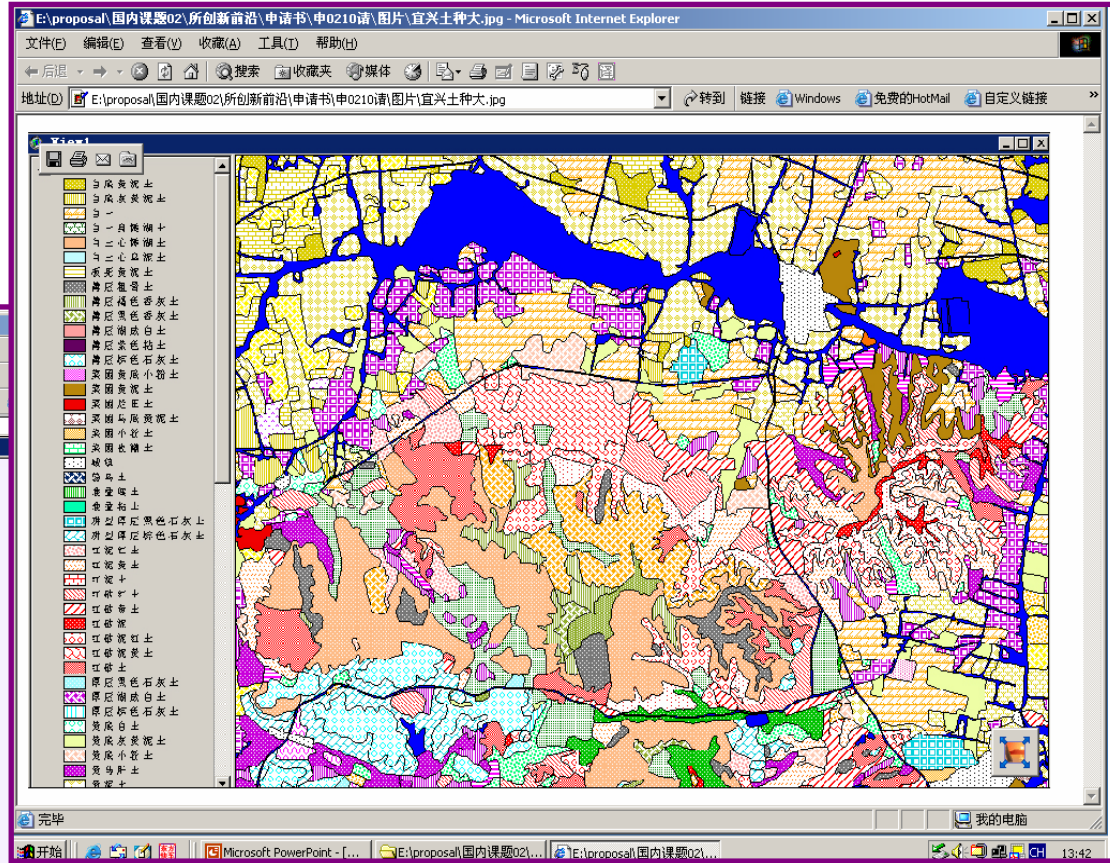
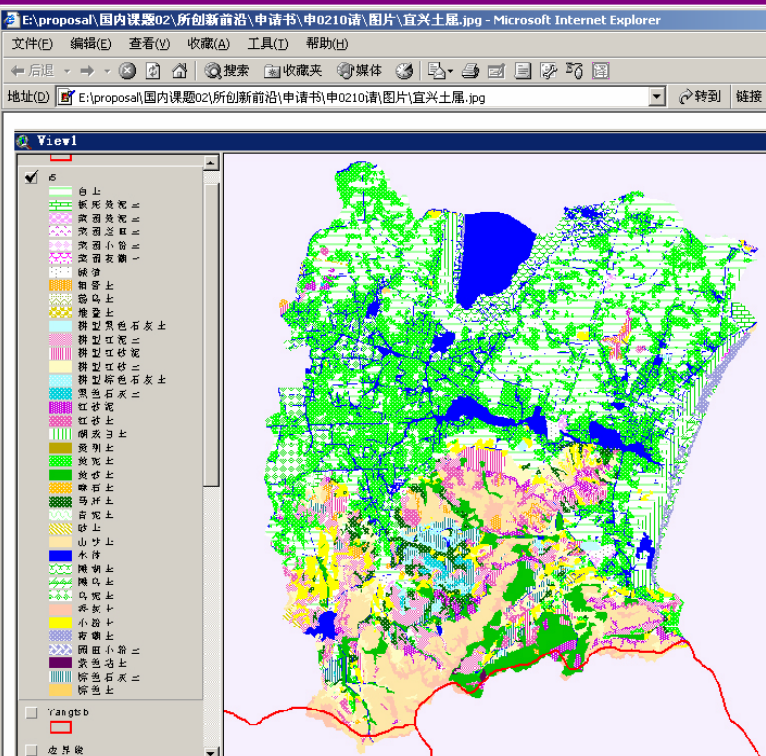
1:1,000,000 digital soil map of China at

Orders, suborders, great groups, sub-groups and families

Scale 1:26,539,756 5,485.0

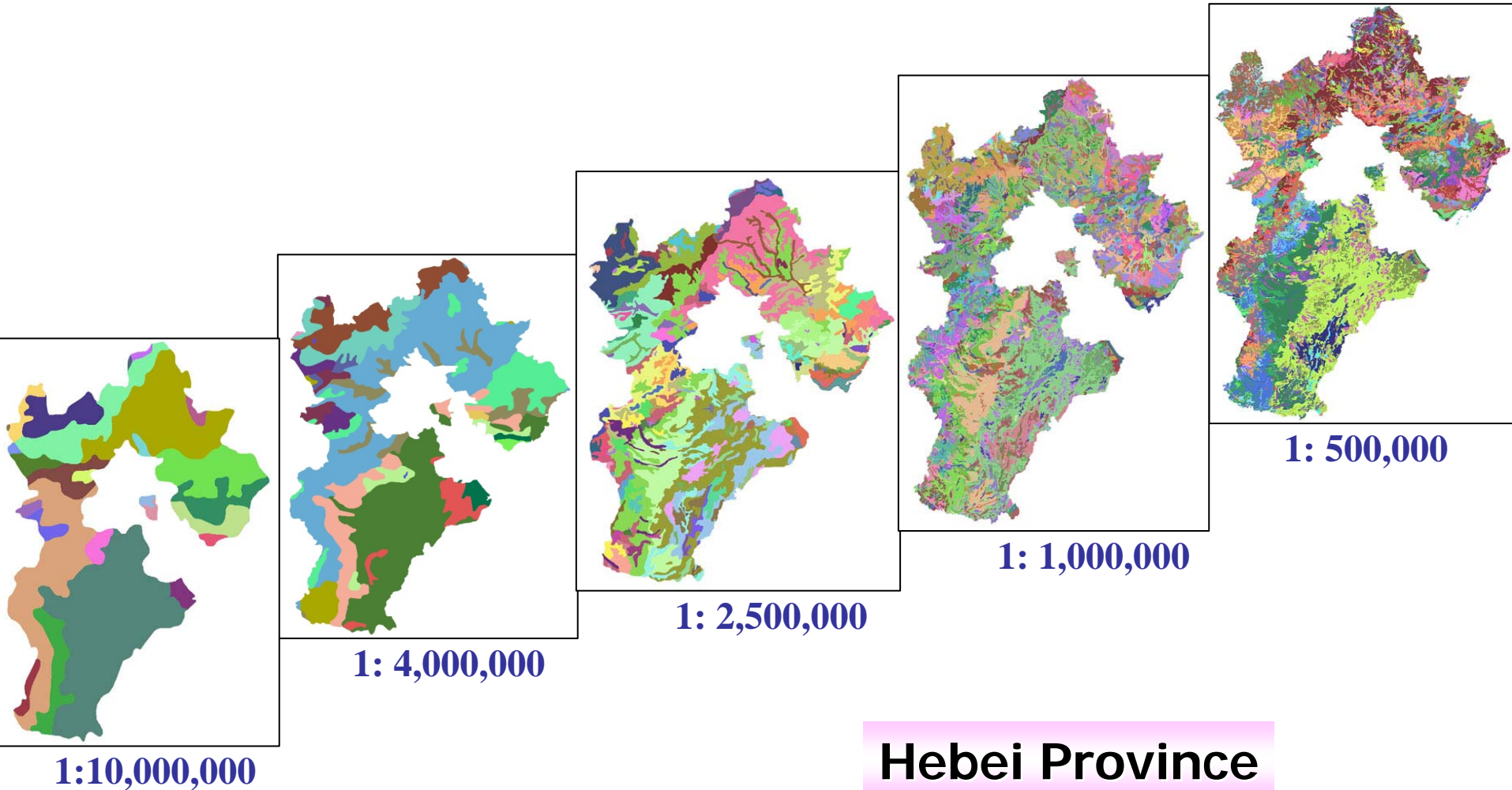


1:50,000 digital soil map of county



Map unit is soil series
1:50,000 soil map of Yixing
County, Jiangsu Province

Digital soil maps at multiple scale

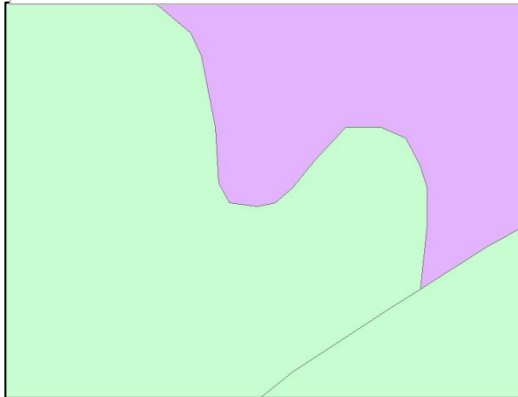


Hebei Province

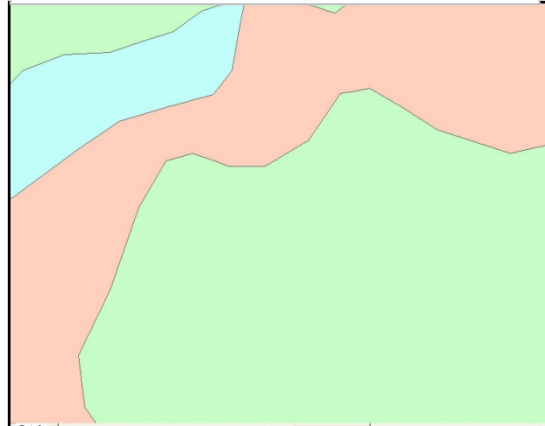
Digital soil maps at multiple scale

Part of the Taihu Lake region

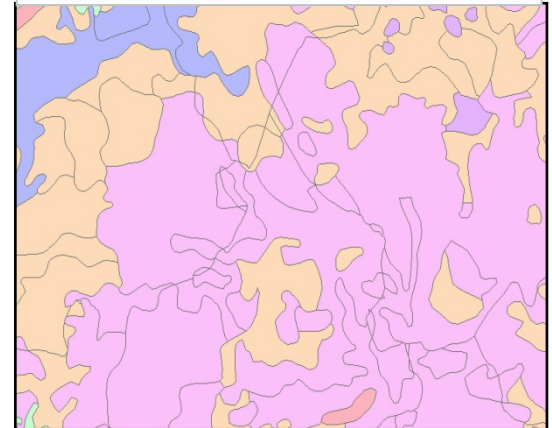
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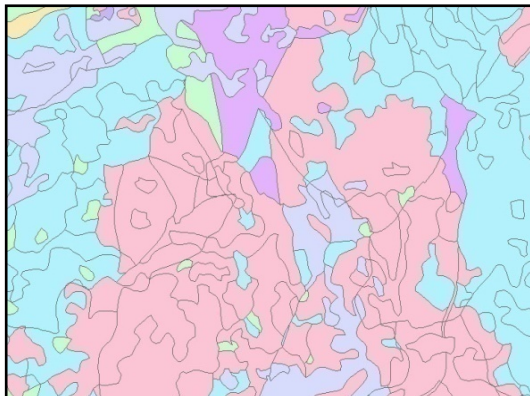
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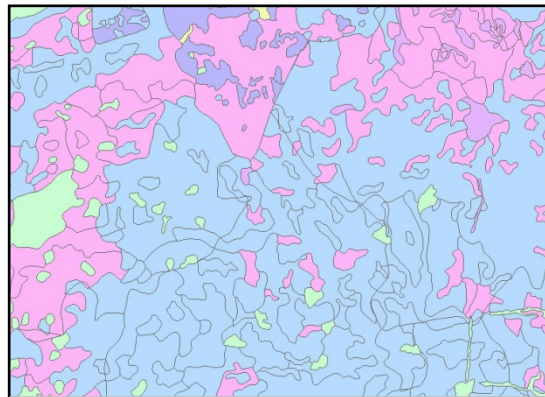
1:1,000,000(492)



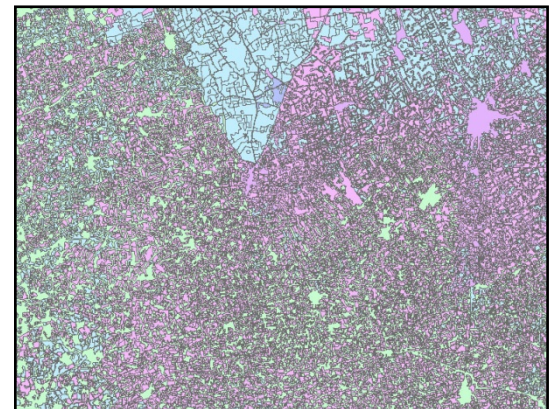
1:500,000(3621)



1:200,000(6167)



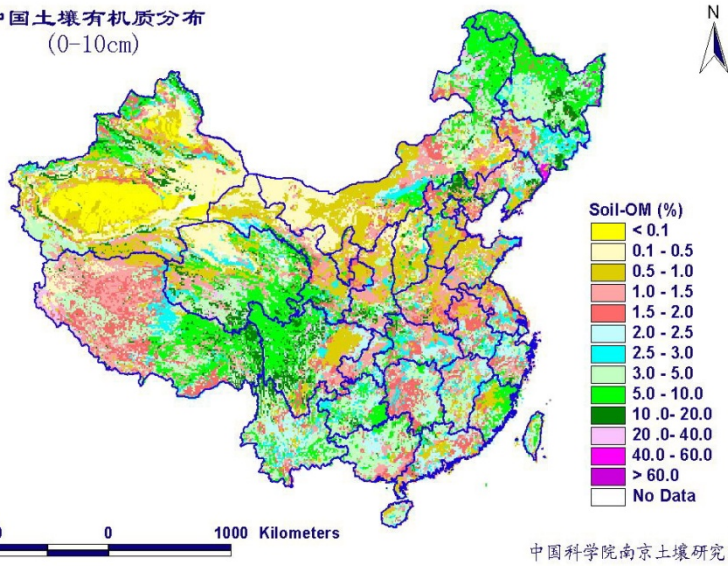
1:50,000(52034)



Soil raster data of China

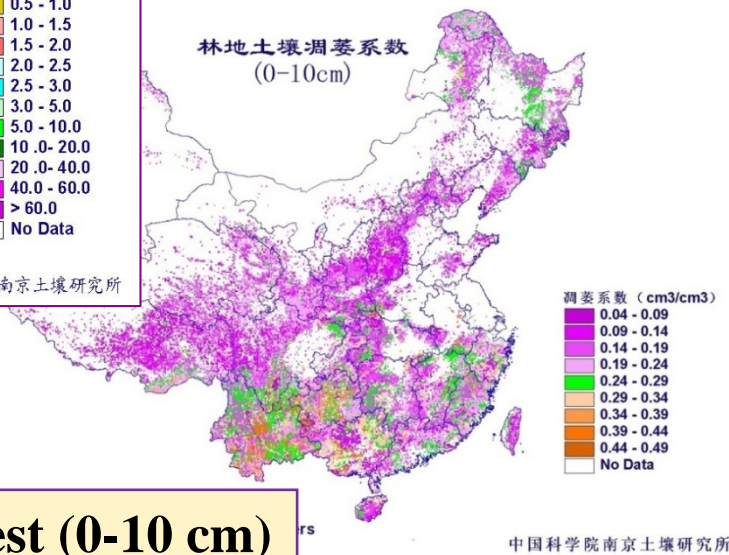
10km*10km or 2km *2km

中国土壤有机质分布
(0-10cm)



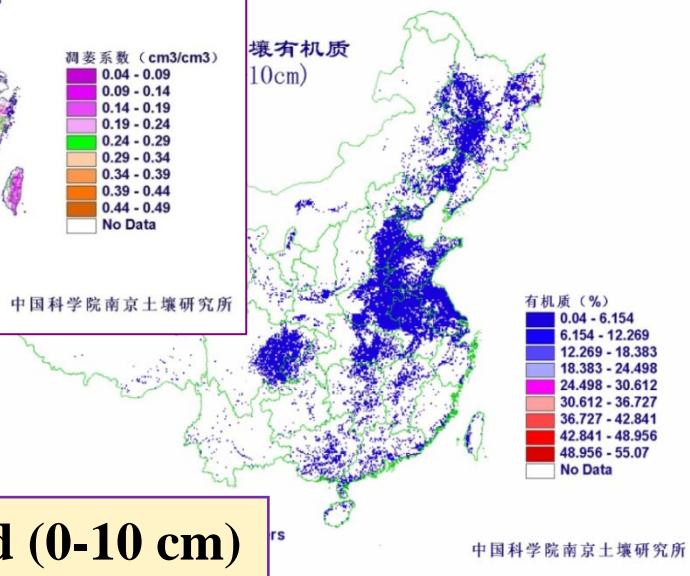
Distribution of **SOM** of China (0-10 cm)

林地土壤凋萎系数
(0-10cm)



Soil wilting point of forest (0-10 cm)

壤有机质
10cm)



Distribution of **SOM** of China's cropland (0-10 cm)

Soil attribute database of China

Part attribute data of one soil profile

Orders (sub- orders)	Great group s	Subgr oups	Famili es	Soil series	Hor izon s	Thickn ess (cm)	Clay (%)	pH	O.M. (%)
Anthrop ic soil	Padd y soil	<u>Hydr omor phic paddy soil</u>	马肝 泥田	马肝 土	Aa	15	24.5	6.3	2.08
					Ap	10	17.5	6.5	1.67
					P	25	32.2	7.4	0.58
					W1	24	37.9	7.5	0.58
					W2	26	44.1	7.3	0.66

A total of about **20,000** soil profiles, **2,000,000** soil analytical data

Harmonized World Soil Database

Harmonized World Soil Database v 1.1

HWSD DESCRIPTION

The Land Use Change and Agriculture Program of IIASA (LUC) and the Food and Agriculture Organization of the United Nations (FAO) have developed a new comprehensive Harmonized World Soil Database (HWSD). Vast volumes of recently collected regional and national updates of soil information were used for this state-of-the-art database. The work was carried out in partnership with:

- ISRIC-World Soil Information, together with FAO, were responsible for the development of regional soil and terrain databases and the WISE soil profile database;
- the European Soil Bureau Network, which had recently completed a major update of soil information for Europe and northern Eurasia, and
- the Institute of Soil Science, Chinese Academy of Sciences, which provided the recent 1:1,000,000 scale Soil Map of China.

The HWSD is of immediate use in the context of the Climate Change Convention and the Kyoto Protocol for soil carbon measurements and for the FAO/IIASA Global Agro-ecological Assessment study (GAEZ 2008), for which HWSD was developed in the first place. The HWSD contributes sound scientific knowledge for planning sustainable expansion of agricultural production to achieve food security and provides information for national and international policymakers in addressing emerging problems of land competition for food production, bio-energy demand and threats to biodiversity.



The **Institute of Soil Science**, Chinese Academy of Sciences, which provided the recent **1:1,000,000 scale Soil Map of China** (<http://www.iiasa.ac.at/Research/LUC/External-World-soil-database/HTML/index.html>)

HWSD Home
Documentation
Download Viewer and Data
Download Data Only

Supplementary data
Terrain Data Description
Terrain Data
Land Cover Data Description
Land Cover Data
Soil Qualities Description
Soil Quality Data

Data Format Information

The soil data provided by **X.Z. Shi** and others of the Institute of Soil Science, Chinese Academy of Sciences (<http://www.geodata.cn>)

National Data for Earth Science of China

国家科技基础条件平台——地球系统科学数据共享平台
Data Sharing Infrastructure of Earth System Science

47 全国1:400万土壤调萎系数分布图(1980s)

48 全国1:400万土壤粘粒含量分布图(1980s)

49 全国1:400万土壤磷肥力质量分布图(1980s)

Data Center for Resource and Environmental Sciences, Chinese Academy of Sciences

RESDC
中国科学院
资源环境科学数据中心

中国科学院资源环境科学数据中心

首页 | 数据集成平台 | 数据应用范例 | 数值研究平台 | 电子政务节点 | 数据共享节点 | 国际交流窗口

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土壤数据分中心

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1 分中心主任：史学正

2 职能分工：

全国土壤主题数据库的建设、共享服务与应用示范

3 现有数据库：

(1) 中国1:100万土壤数据库

中国1:100万土壤数据库包括土壤类型空间数据库、土壤属性数据库，是以全国第二次土壤普查数据为基础建立起来的。土壤空间数据库，是以全国土壤普查办公室编制，并由西安出版社出版发行的《1:100万中华人民共和国土壤图》为蓝本，由中国科学院南京土壤研究所数字化、修正和编辑后建成的。本数据库采用了传统的“土壤发生分类”系统，基本制图单元为亚类，共分出12土纲，61个土类，248个亚类。土壤属性数据库中的数据引自《中国土种志》，该套土种志共分六卷，共收集了全国2540个土种的数据资料。土壤理化性质包括土层厚度、土壤颗粒组成、土壤质地，pH、有机质、全N、全P、全K以及有效P和有效K等。

1:100万中国土壤数据库于2003年11月建成，历经4年。数据库覆盖了整个中国，采用GIS技术手段很好地实现了空间与属性的一体化连接，并以矢量数据格式储存，它是目前全国唯一的、也是最为详细的数据库，是全国和区域性进行现代化农业生产、土地资源、水资源和森林资源开发利用、环境保护、生态环境重建等必不可少的数字化基础资料。

(2) 中国土壤属性数据库及查询系统

The soil data provided by **X.Z. Shi** and others of the Institute of Soil Science, Chinese Academy of Sciences

(<http://www.resdc.cn>)

Data Center for Environmental and Ecological Sciences of Western China



中国西部环境与生态科学数据中心
Environmental and Ecological Science Data Center for West China



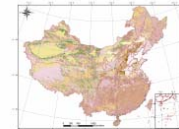
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首页 > 数据产品与服务 > 查看元数据

数据资源介绍:中国1:100万土壤数据集

全国第二次土壤普查始于1979年，1994年结束，历时16年。参加普查的各级领导干部、农业科技人员84000人，共计完成了2444个县、312个国营农（牧、林）场和44个林业区的土壤普查。此次土壤普查，依据全国统一的调查技术规程和土壤分类系统，从县和乡的土壤详查做起，在土壤普查过程中分别采集土壤样品和编制大比例尺土壤详查图，然后按地级市、省级和全国逐级汇总成图。基础调查的成图比例尺南方农区一般为1:10,000（个别省、市为1:5,000及1:2,000），北方农区一般为1:10,000或1:25,000，林区及牧区为1:50,000，西藏高原、新疆草原和荒漠地区为1:20万。调查工作由经过培训的专业队伍进行，并普遍应用了航片和卫片土壤解译成图技术，保证了基础图件具有较高的精度。



全国1:100万土壤图的编制准备工作始于1986年，首先选择了七个典型区域编制了七幅样图，编制过程中进行了不同制图单元和不同制图综合标准等项对比试验，以比较图面效果。在对样图以及收集到的国内外小比例尺土壤图分析研究的基础上，于1990年制订了《中国1:100万幅土壤图编绘规范》，1992年正式开始1:100万中华人民共和国土壤图的编制工作。编图的主要基础资料是各省、市、自治区编制的省级土壤图、相同比例尺的地形图和卫片，并广泛参考各省土壤志，有关的地质图、森林分布图、土地利用现状图以及过去的土壤调查资料如华北平原土壤图等。各省、市和自治区土壤图的比例尺有所不同，其中西部地区主要是1:100万的土壤图，东部地区则以1:50万的土壤图为主。台湾、香港和澳门地区则是直接参考广东省的土壤分布规律和卫片解译标志，直接应用卫片解译成图。这是我国在扎实的工作基础与丰富的数据资料基础上编成的第一套1:100万土壤图。1995年，全国土壤普查办公室于编制并出版了《1:100万中华人民共和国土壤图》，该图采用了传统的“土壤发生分类”系统，基本制图单元为亚类，共分出12土纲，61个土类，227个亚类。

在中国科学院知识创新项目等项目的支持下，中科院南京土壤研究所史学正、于东升和潘资章等人对64幅1:100万的标准分幅图进行了数字化，并在此基础上进行了详细修边及编辑，最终生产了中国1:100万土壤数据集。该数据集还包括土壤属性记录2647条，属性数据项16个，基本覆盖了全国各种类型土壤及其主要属性特征。

该数据集为资源数据介绍，有需要的用户，请到中科院南京土壤研究所申请

The soil data provided by **X.Z. Shi** and others of the Institute of Soil Science, Chinese Academy of Sciences

(<http://westdc.westgis.ac.cn>)

Institutions or universities for using soil data of China (reported by data center for resource and environmental science, CAS)

27-Dec-05	Research Center for Eco-Environmental Sciences, CAS	Regional	中国东部与西部典型区土地利用变化与比较
07-Mar-06	Beijing Normal University	Regional	漳卫南运河子流域源污染SWAT模型估算研究
18-Sep-06	Peking University	Regional	甘肃省西汉水流域水土流失研究
07-Feb-07	Department of Thermal Engineering, Tsinghua University	National	中国生物质与煤共气化研究
13-May-08	Institute of Soil and Water Conservation, CAS & MWR	National	中国主要水蚀区土壤侵蚀过程与调控研究
26-Feb-09	Institute of Remote Sensing Applications, CAS	National	中国区域历史土地利用覆盖数据对中国区域气候的影响

- ◆ During the years of **2005 ~ 2009**
- ◆ Total **137** research projects used our soil database of China for research of agriculture etc.
- ◆ Show you **six cases** above

Happy or Worried?

◆ Happy!

It is happy for all soil data user!

It is happy for us so many national and international research projects to use **our soil database of China**

◆ Worried! for what???

Existence for our research team in institute

◆ In our evaluation system for research team

-there is **no any score** for our team to establish large soil database

-focus on more care **papers** published in international journals, **research funding**, **national awards** etc.

◆ In order to survive for our research team

We should and must do the basic or applied researches based on **our soil database of China**

What kind of research we can do?

- ◆ What kind of research we can do based on **our soil database** of China?
- ◆ Maybe get good results carry out the following 3 aspects
 - ① **Soil reference** between soil classification systems
 - ② Regional and national **scale effect** in soil science
 - ③ Regional **soil carbon dynamics** and global climate change

Soil reference System

Dilemma?

Problems using Chinese soil maps

- ◆ **ST** (Soil Taxonomy) and **WRB** (World Reference Base for Soil Resources) is often used in international communication
- ◆ Two soil classification systems in China is in use
GSCC (**G**enetic **S**oil **C**lassification of **C**hina)
CST (**C**hinese **S**oil **T**axonomy)
- ◆ The **GSCC** is different from **ST** or **WRB**
We need soil reference system
from **GSCC** to **ST**, **WRB** and **CST**

Methods for Study on Soil Reference

- ◆ On basis of soil information from soil survey reports such as "Soil Series of China " etc.
- ◆ Sort out name of each soil series in **GSCC** and **ST or WRB**
- ◆ Link the profile reference to the **1:1,000,000 soil map of China**

An example for the reference of **3** out of **7,292** soil profiles

Soil profile location County/Province	GSCC		Subgroup in ST
	Great group	Species	
Qiongsan/ Hainan	Latosols	Light Latosols	Rhodic Paleudults
Ji'an/ Jiangxi	Red soils	Red yellow earth with clayed bottom	Plinthudults
Wujiang/ Jiangsu	Paddy soils	Yellow paddy earths	Typic Endoaquepts

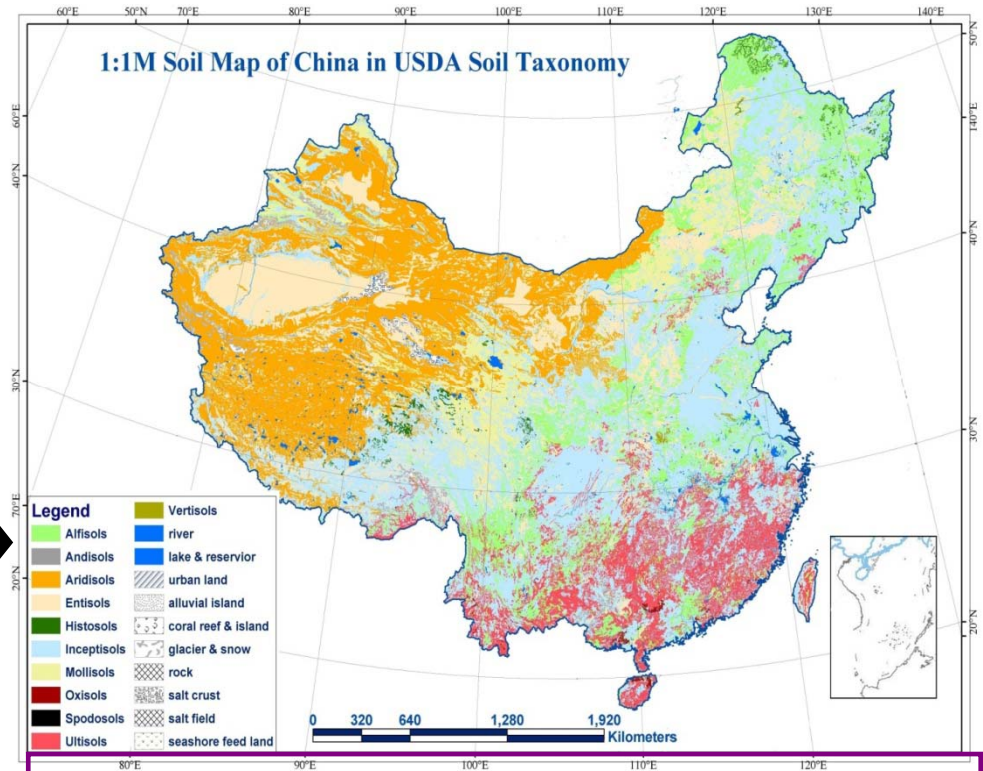
1:1,000,000 digital soil map of China Based on ST (soil taxonomy)



"PKB" Method
(Zhao, Shi et al., SSSAJ, 2006)

Soil reference bases of China (7292 profiles)

4	1251	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
5	1252	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
6	1253	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
7	1254	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
8	1255	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
9	1256	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
10	1342	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
11	1411	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
12	1412	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
13	1515	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
14	1516	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
15	1517	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
16	1518	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
17	1519	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
18	1520	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
19	1521	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
20	1522	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
21	1523	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
22	1524	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
23	1525	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
24	1526	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c
25	1527	江苏省徐州市	黄棕壤	黄棕壤	普通黄棕壤	Typ-Hap-Bt1c	典型的黄棕壤	Typ-HapBt1c	黄棕壤	普通黄棕壤	Typ-HapBt1c



- ◆ Digital soil order map of China Based on **ST (Soil Taxonomy)**
- ◆ suborder, great group, subgroup

Cross-reference Between GSCC orders and ST orders

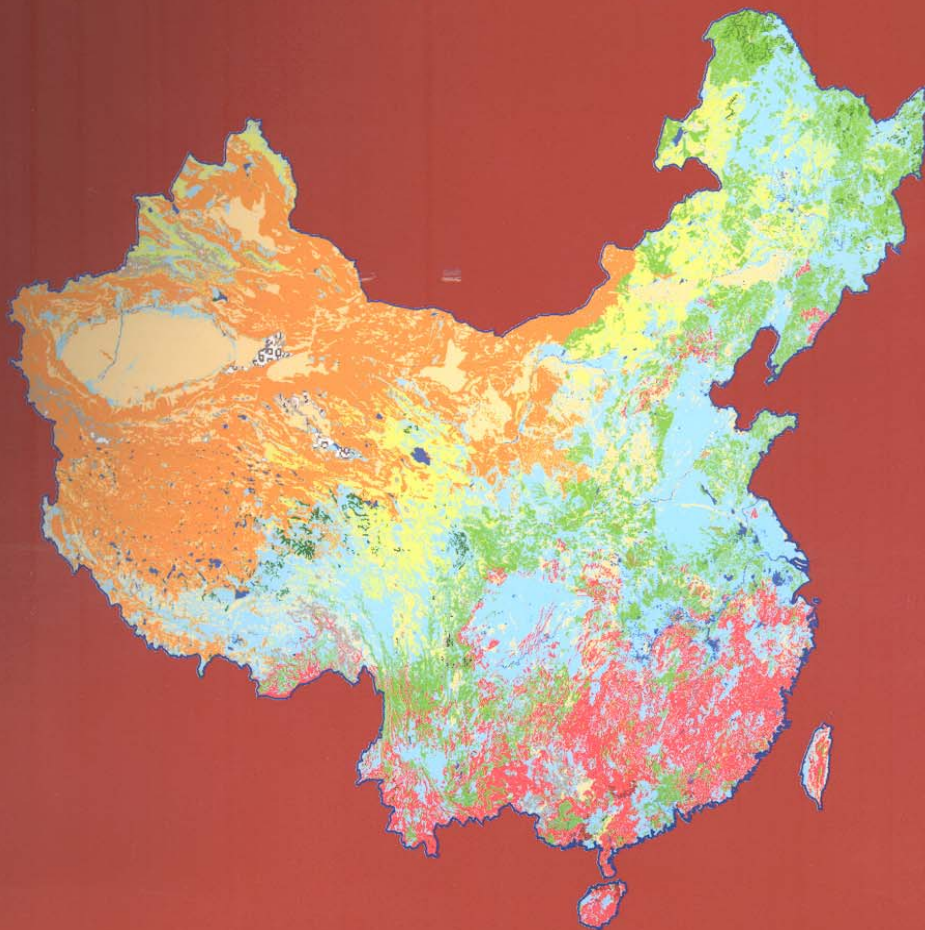
*RB: Referencibility

GSCC Soil Order	ST Soil order	10³ km²	Maximum RB* (%)	GSCC Soil Order	ST Soil Order	10³ km²	Maximum RB* (%)
Ferralsols	Ultisols	727	64.7	Amorphic soils	Entisols	1133	69.8
Alfisols	Alfisols	716	67.6	Semi-Aquatic soils	Inceptisols	650	87.0
Semi-Alfisols	Alfisols	232	54.3	Aquatic soils	Inceptisols	88.8	60.6
Pedocal	Mollisols	417	70.5	Alkali-saline soils	Aridisols	82.4	44.9
Aridisols	Aridisols	298	97.2	Anthrosols	Inceptisols	385	78.7
Desert soils	Aridisols	604	100	Alpine soils	Inceptisols	996	50.4

- ◆ Shi X. Z. et al., 2006, Soil Sci. Soc. Am. J. 70 (1) : 78-83
- ◆ Shi X. Z. et al., 2010, Geoderma,154(1): 344-350
- ◆ Shi X. Z. et al., 2004, Chinese Science Bulletin, 49(14): 1507-1511
- ◆ Shi X. Z., et al.,2006, Pedosphere 16(2):147-153
- ◆ Shi X. Z., et al., 2010, Computers and Geosciences, 36: 768-775

SSSAJ

Soil Science Society of America Journal



Publication

The results
of Chinese soil
reference system
published in
SSSAJ, 2006 (1 issue)

This is first time for
Chinese soil scientist
to publish the results
in the journal cover

Scale effect and regional soil Carbon



Climate change

- ◆ Current China's targets for reducing GHG emissions
- ◆ Both afforestation and soil C sequestration can offset the increment of atmospheric CO₂ emissions

Scale effect

- 🕒 SOC storage estimates in China?
- 🕒 SOC dynamics in crop land of China?

Soil database of China

Problems in estimating SOC storage

- ◆ What's the SOC storage in China?
How to distribute at regional scales?
- ◆ **Problems: estimates** of SOC storage
at regional scales with **great uncertainty**

Unit: Pg C

Rubey	Bohn	Post	Eswaran	Batjes	For global			For China	
1951	1976	1990	1993	1996					
710	2949	1395	1576	~1548					
J.Y. Fang	G.X. Pan	S.Q. Wang	K.R. Li	X.L. Xie	D.S. Yu	Z.B. Xie	Z.P. Li		
1996	1999	1999	2003	2004	2005	2007	2007		
185	50	100.2	82.65	84.4	89.14	89.61	83.8		

Three are more or less 4 times differences

SOC Storage estimates in China

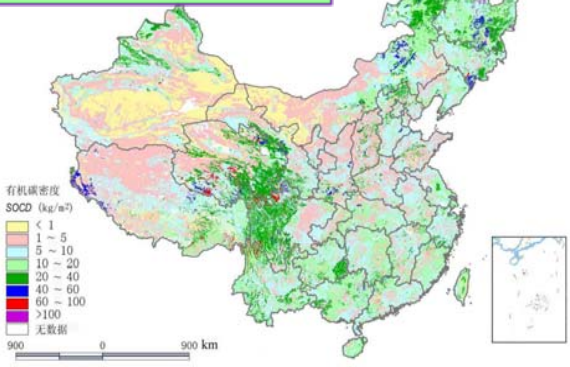
Researcher	Soil map scale (source of area)	Number of soil profiles	Area (M ha)	SOC storage (Pg)
J.Y. Fang (1996)	1:10,000,000 (1978)	725	944.9	185 (0-1 m)
G.X. Pan (1999)	Soil Series of China	2500	915	50 (profile depth)
S.Q. Wang (2000)	1:4,000,000 (1988)	2473	877.6	92.4 (profile depth)
F. Jin (2001)	1:4,000,000 (1988)	3600	865.2	81.8
H.B. Wu (2003)	1:4,000,000 (unknown)	923	881.8	77.4
X.L. Xie (2004)	1:4,000,000 (2000)	2456	924	84.4 (0-1 m)
D.S. Yu (2005)	1:100万 (1995)	7300	928.1	89.14 (0-1 m)
Z.B. Xie (2007)	Soil Series of China	2473	870.94	89.61(0-1 m)
Z.P. Li (2007)	1:4,000,000 (2000)	2456	918	83.8 (0-1 m)

More accurate estimates of SOC storage in China (X.Z. Shi and D.S. Yu, 2005)

- ◆ The most detail soil data: detail soil maps and more soil profile data
- ◆ Our results have been used as the **initial basic values** for regional SOC dynamic research in China.

Basic values of SOC storage in China

Distribution of SOCD



SOCD in China (0-1 m):

96.0 t C/ha

SOC storage in China (0-1 m): **89.14 Pg (10¹⁵g)**

Land use	Farmland	Forestland	Shrubland	Grassland
SOCD	92.2	143.3	115.3	82.4
SOC storage	12.20	21.50	25.55	11.34

Soil type	SOCD	SOC storage
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Latosols	92.3	0.39
----------	------	------

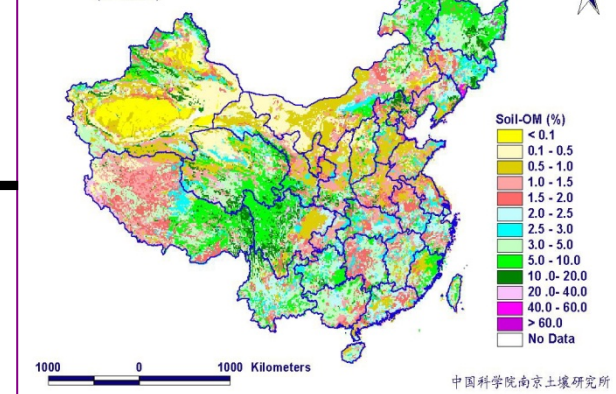
Paddy soils	111.4	5.01
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Fluvo-aquic soils	65.4	2.25
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Inceptisols (始成土)	102.8	34.39
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Alfisols (淋溶土)	134.1	16.41
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中国土壤有机质分布 (0-10cm)



- ◆ Yu D.S et al., 2007, J. Environmental Management, 85: 680-689
- ◆ Liu Q.H., X.Z. Shi, et al., 2006, Global Biogeochem. Cycles, 20
- ◆ Yu D.S. et al., 2007, Pedosphere. 17(1): 11-18

Scale effect of SOC storage estimates (Hebei Province)

Zhao Y.C., X.S. Shi, et al., 2006, Soil Sci. Soc. Am. J. 70(4).
 Zhao Y.C., X.Z. Shi, et al., 2005, Chemosphere 59.

1800

Both soil map scale and linking method are different

The maximum difference: **33%**

PKB linking method

The same linking method different soil map scale

The maximum difference: **21%**

The same soil map scale different linking method

The maximum difference: **16%**

1200

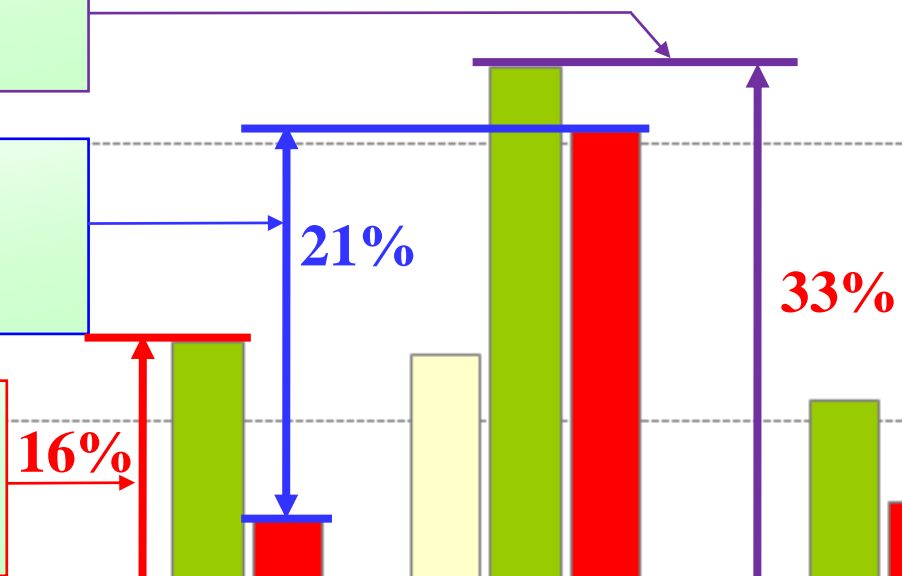
1:500 000

1:1 000 000

1:2 500 000

1:4 000 000

1:10 000 000

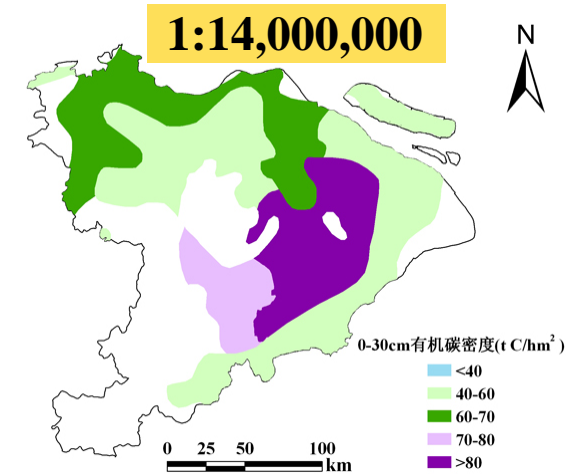
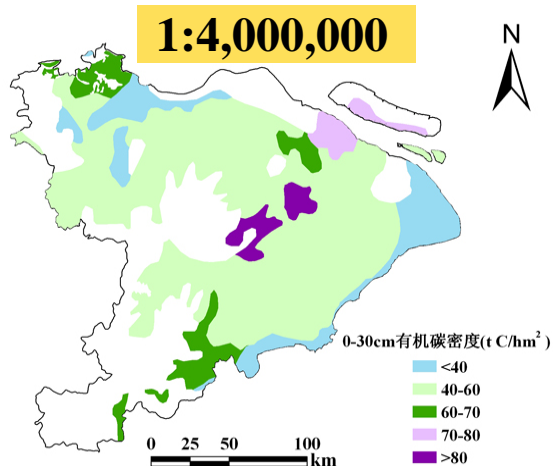
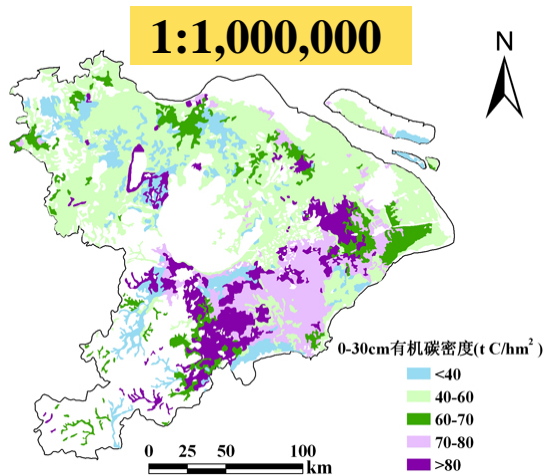
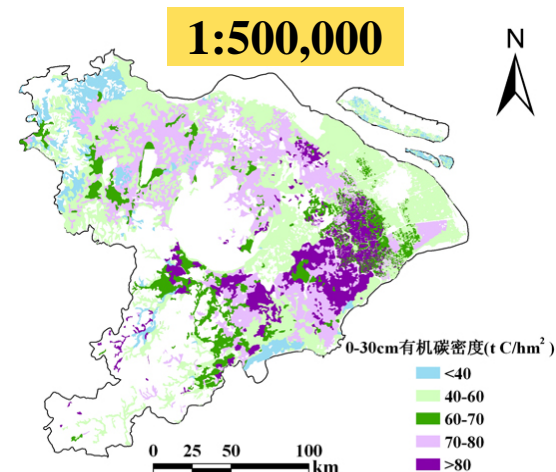
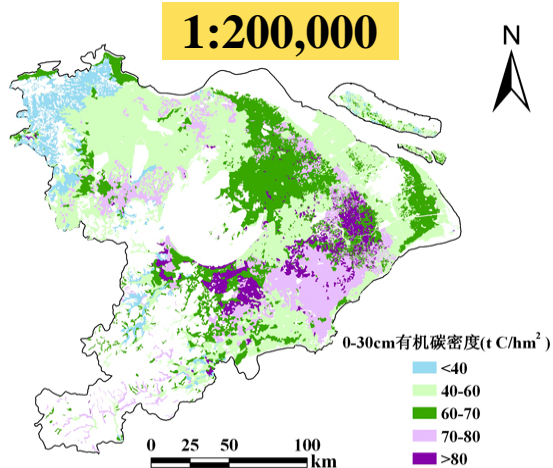
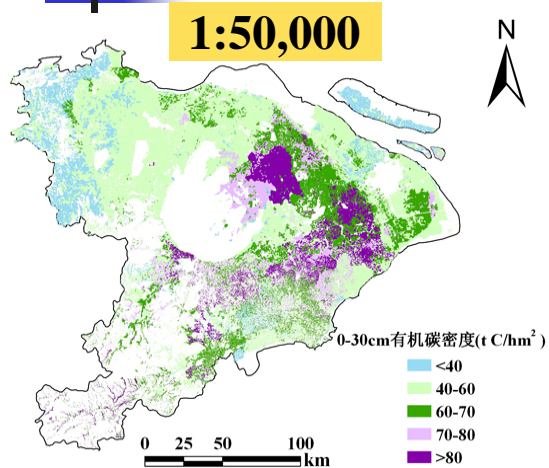


Factors: soil map scale, soil profile numbers, and linking method between soil spatial and attribute data

The more detail soil maps and more soil profiles with the PKB linking method

The more accurate SOC storage

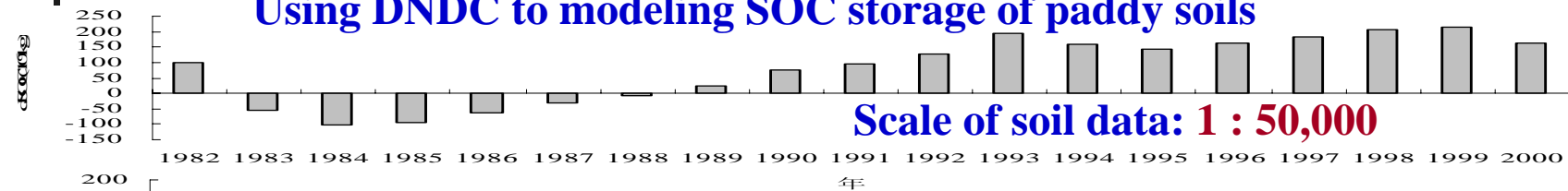
Scale effect of distribution of SOC Density (Taihu Lake region)



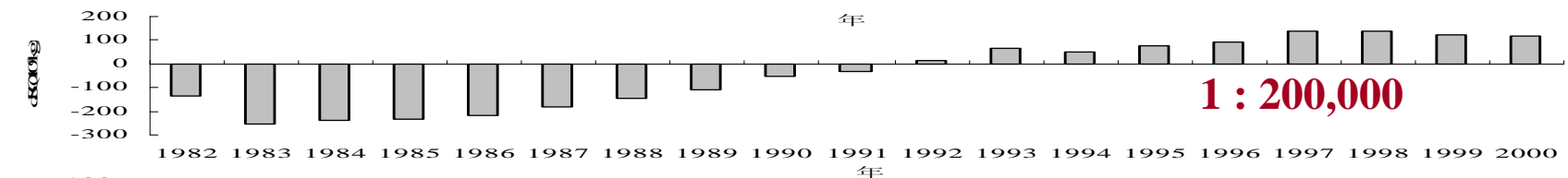
Scale effect of annual dynamics of SOC storage (Taihu Lake region)

Using DNDC to modeling SOC storage of paddy soils

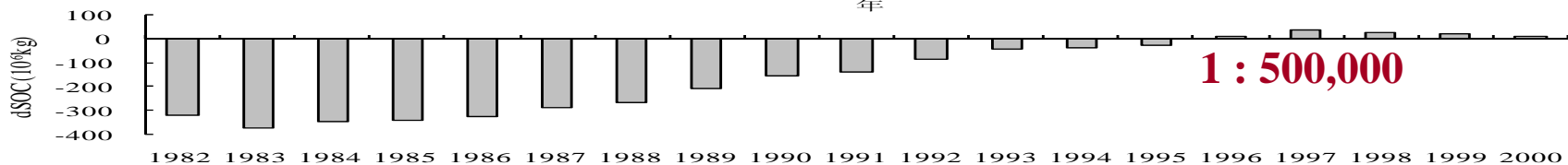
Scale of soil data: 1 : 50,000



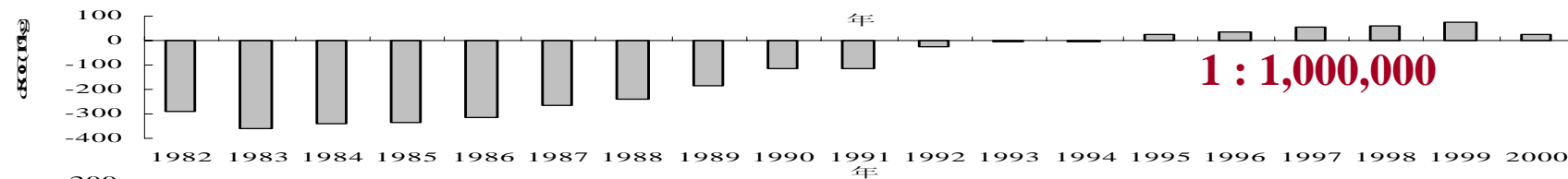
1 : 200,000



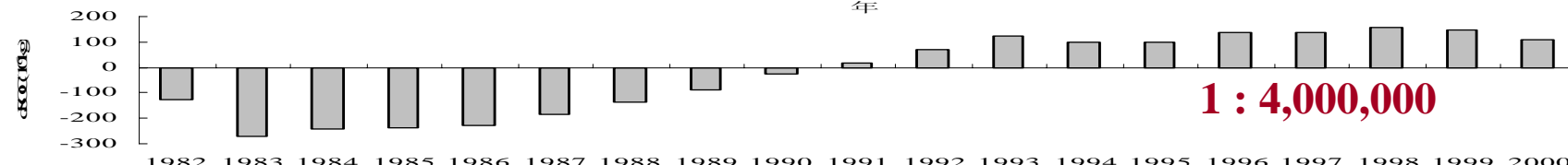
1 : 500,000



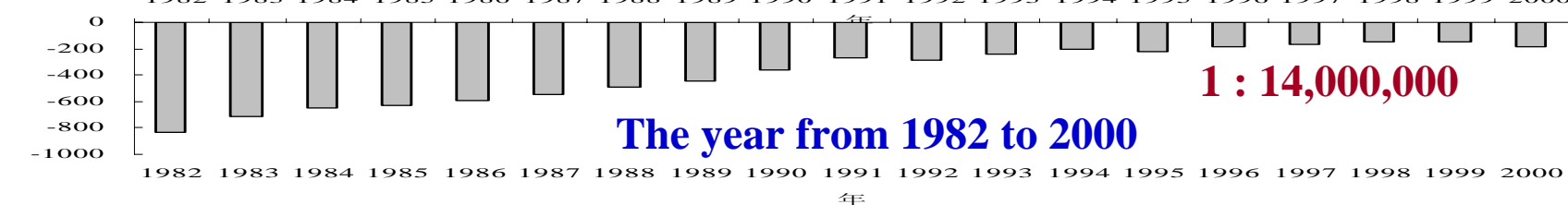
1 : 1,000,000



1 : 4,000,000



1 : 14,000,000



The year from 1982 to 2000

Published papers

◆ **18 papers** published in international journals for **the recent 5 years** of 2007 – 2011, related with SOC at regional scale

◆ **The more papers, the more score** in evaluation

◆ **The more funding!!**
◆ Xu S.X., X.Z. Shi, et al., 2011, Geoderma, 166: 206-213.

◆ Xu S.X., X.Z. Shi, et al., 2011, Pedosphere, 21(6): 696–705.

◆ **Institute director happy, we are all happy!!**
◆ Yu D. S., X. Z. Shi et al., 2011, Global Biogeochem. Cycles, 25, GBCG0004

◆ Yu D. S., X. Z. Shi et al., 2011, Pedosphere, 21(2):207-213

◆ Wang S. H., X. Z. Shi, 2011, Pedosphere, 21, (3): 277-287

◆ Zhang Z. Q., D. S. Yu, X. Z. Shi et al., 2011, Environmental Earth Sciences, 64(2): 319-328

◆ Shi X. Z., et al., 2010, Climatic Change, 102: 579-591

◆ Wang D. D., X. Z. Shi et al., 2010, Geoderma, 154(1): 302-310

◆ Wang D. D., X. Z. Shi, et al., 2010, Pedosphere, 20(4): 525-535.

◆ Wang D. D., X. Z. Shi et al., 2010, J. of Soils and Sediments, 10 (6) : 1007-1017

◆ Zhang Z. Q., D. S. Yu, X. Z. Shi et al., 2010, Soil and Tillage Research, 110:2-7

◆ Zhang Z.Q., D. S. Yu, X. Z. Shi et al., 2010, Soil Science and Plant Nutrition, 56 (2): 307-318

◆ Shi X. Z. et al., 2009, Soil and Tillage Research, 105(2):322-327

◆ Zhang L. M, D. S. Yu, X. Z. Shi, et al., 2009, Biogeosciences, 6: 739-749

◆ Zhang L. M, D. S. Yu, X. Z. Shi et al., 2009, Atmospheric Environment, 43: 2737-2646

◆ Zhang Y., Y. C. Zhao, X. Z. Shi et al., 2008, Geoderma, 146: 449-456

◆ Zhao Y. C., et al., X. Z. Shi, 2008, Environ Monit Assess. 138: 343-355

◆ Yu D. S., X. Z. Shi et al., 2007, Pedosphere. 17(1): 11-18.

◆ Yu D. S., X. Z. Shi et al., 2007, J. Environmental Management, 85: 680-689

Conclusions

- ◆ Soil database is useful for researching some regional issues in soil science
- ◆ It is useful for basic researches on soil reference system, scale effect in soil science, mitigating global climate change related with SOC at regional scale etc.
- ◆ Establishing soil database is an important, hard and worried works
- ◆ Establishing soil database is only a base for soil science
- ◆ It is **really our works** for soil scientists to do **more research works** based on **our soil database**

A scenic view of a mountain range with mist and pine trees. The mountains are rugged and rocky, with several prominent peaks. The sky is a pale blue, and the mist is a soft, white color. The pine trees are dark green and are scattered across the mountain slopes. The overall atmosphere is serene and majestic.

Thanks !