Chinese Water Cycle Program

China IGOS-IGWCO working Group

Tentative Working Plan

Involved IGWCO in June, 2004.

- IGWCO-China WG (Working Group) established in Nov., 2004
- In processing 3 to 10 year plan from now.

Goals:

1. Integrate Assessing Water Cycle Elements
2. Applications to Rational Water Resource development and Management,

Tasks:

1.Capacity Building
2.Research on Water Elements
3.Application of IGWCO study to socio-economy: China and world
4. Synthesis and Coupling Water Cycle Systems
5.Scale problems

Tasks: 1.Capacity Building

- **Data base--Space-based, in-situ data and records**
- **GIS development**
- **Training and technology sharing**
- **Application to water management**
- **Take active part in IGWCO and others**

Tasks: 2. Research on Water Elements

- Precipitation
- Soil Moisture
- River flow and Storage
- Clouds and Water vapor
- Evaporation and Evapotranspiration
- Groundwater
- Water Quility
- Cryosphere e.g.,Tibet. Mountaun glacers

Tasks: 3. Application of IGWCO study to socio-economy: China and world

- Water shorage, Drought, Flood (warning and controlling), water security,
- Water quility and health
- Pollution controlling
- Eco-environmental flows deformination

Task 4. Synthesis and Coupling Water Cycle Systems with feedbacks

- Hydrological process models
- Distributed Hydrological Modelling (HIMS)

Task 5. Scale problems

- Catchment level
- Large Rivers in China (Yellow, Yangtze…..)
- Countrywide
- Globe (Collaborating Internetional GWSP, IHP IAHS, IWRA Commities)

Example 1:
Capacity building

The Spectral Database of Typical Objects on Land Surfaces

The Spectral Database Contruction
（波谱数据库建设）

- **Establish the uniform standard for spectral data administration and measuring.(**建立波普数据管理和测量标准）
- **Collect the existing spectral data and classify into grades in quality**（收集已有数据并进行质量分级）
- **New spectral data measuring** （新数据采集）
- **Collect model for spectrum simulation**（收集波谱模型）
- **Collect knowledge for simulation and application** （收集有助于模拟和应用的先验知识）
- **Web service and data sharing**（网络服务）

Typical Objects

- Rocks and minerals(岩矿,completed)
- Water body(水体, completed)
- Vegetation(植被, completed)
  - Crops: Wheat, Maize, Paddy rice, Rape, Cotton
- Soil/Desert(土壤/沙漠, in process)
- Artificial Structure(建筑, in process)
- Snow pack/Ice(冰雪, in process)

Application Training of Water Spectral Data

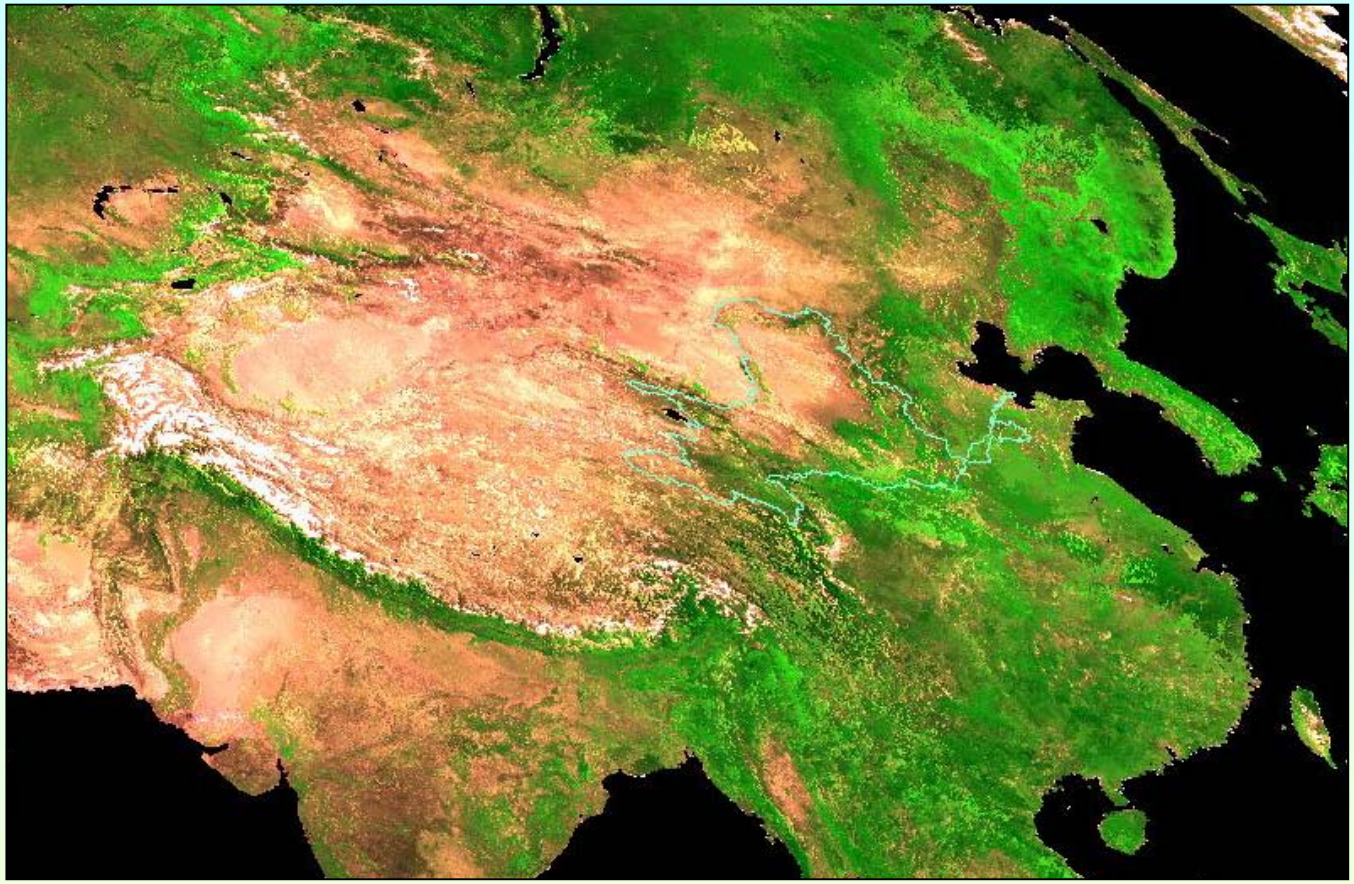
- Algae chlorophyll density distribution(藻类叶绿素密度分布监测)
- Suspending materials density(悬浮物质监测）
- Water Quility & Pollution

Example 2:
Capacity building

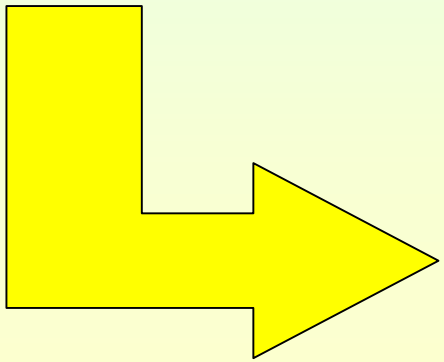
The Soil Moisture Detections

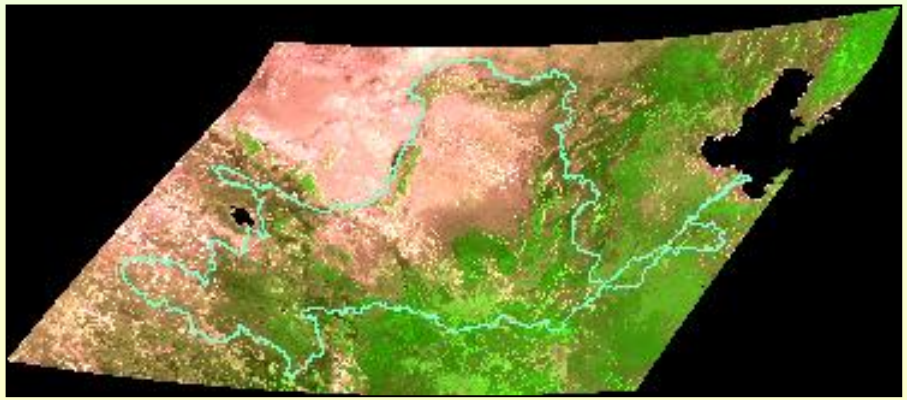
Case of IGWCO in China: detecting the soil water in 1m profile

The method of detecting the soil surface water was put forward by combining VTCI (Vegetation Temperature Condition Index) and MI (Moisture Index) based on RS data and meteorological data, soil water correlation model from surface layer to deep layer was established by the field data. Finally, the method could be used to detect soil water in 1 m soil profile and give the monthly soil water in whole Yellow River Basin during 1982~2000.

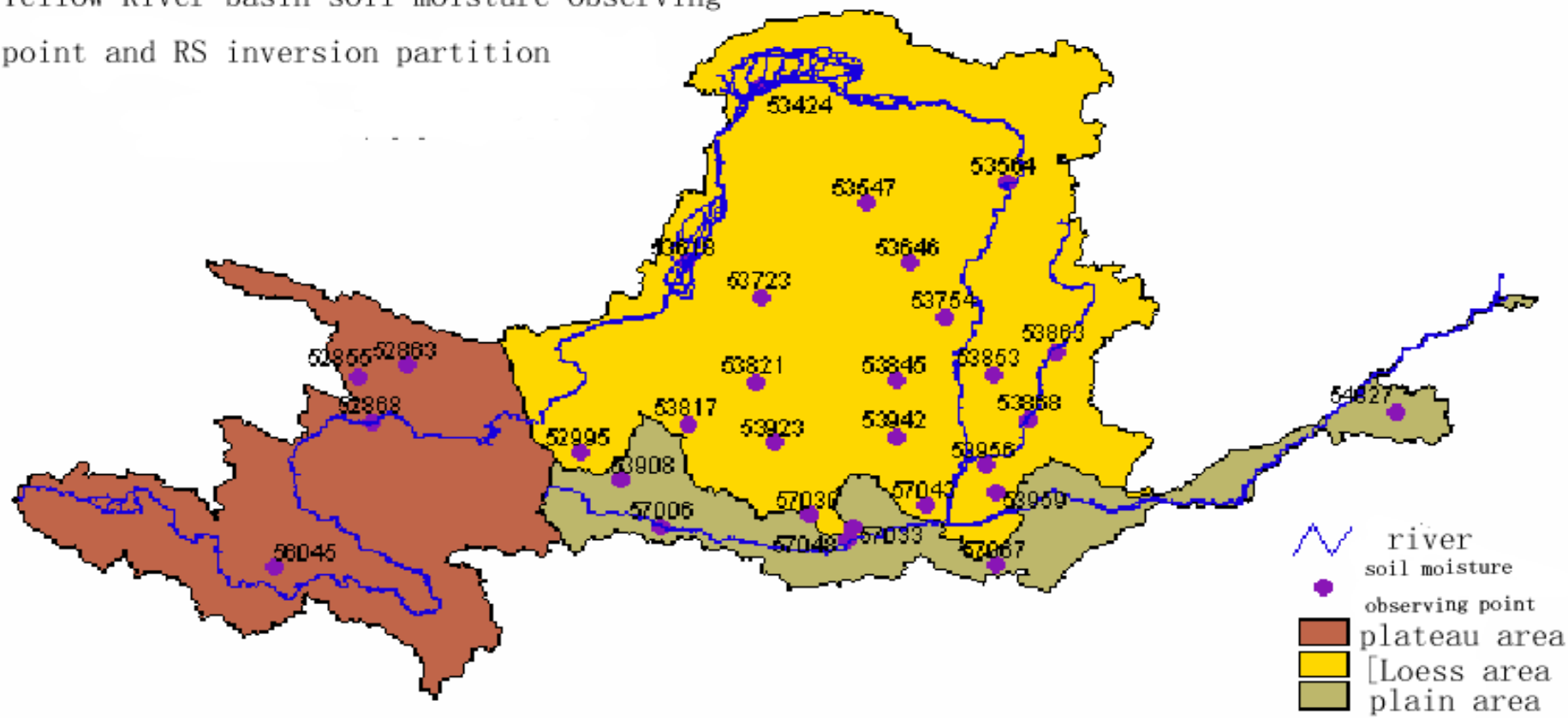


The Location Of YRB





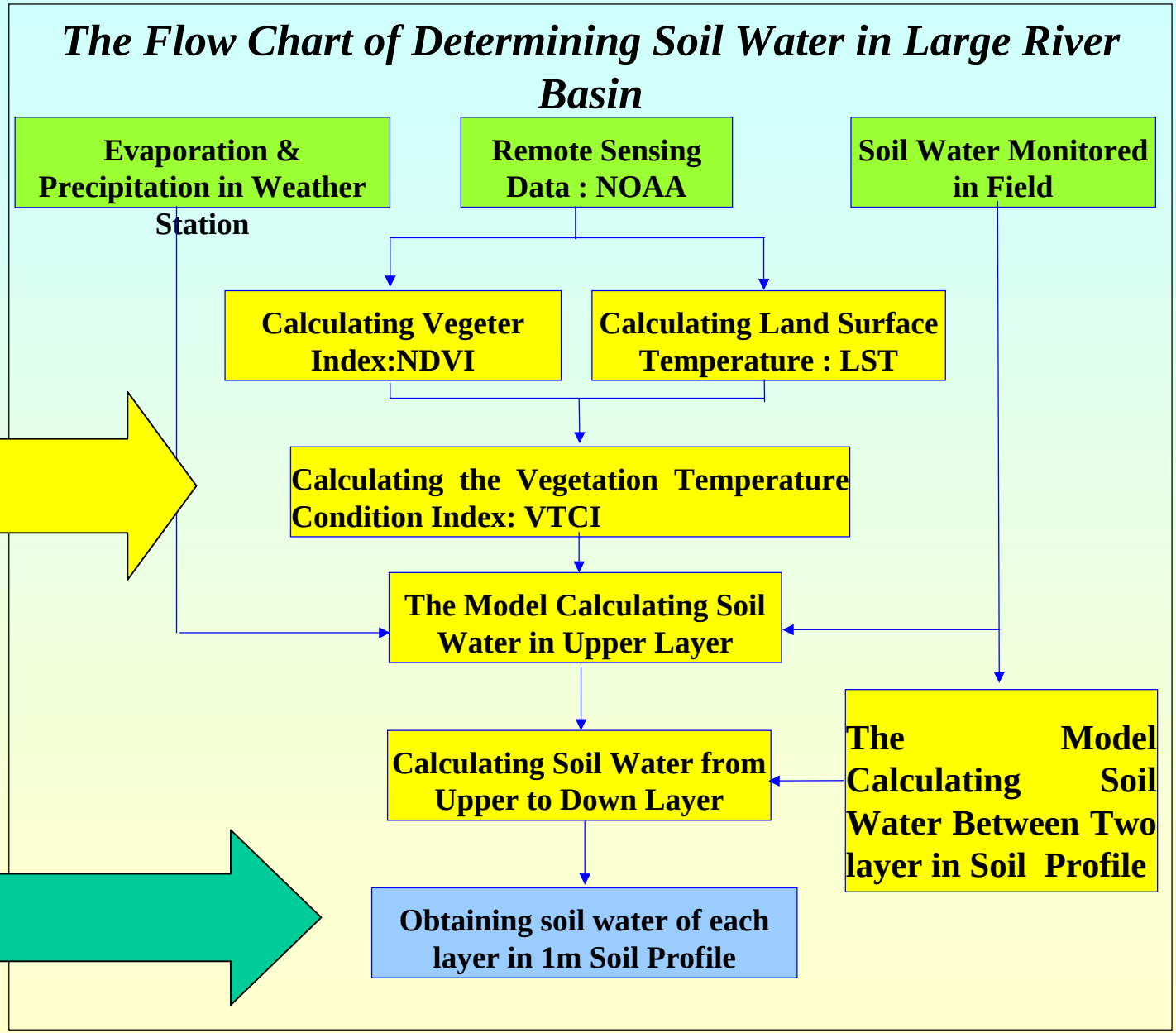
Yellow River basin soil moisture observing point and RS inversion partition



Database For IGWCO based on Remote Sensing, In-situ and conventional information

The method and models to determining soil water in 1m soil profile in Large River Basin

The result is fairly good and can be provided for better understanding of the water cycle changes in the YRB.



Soil surface moisture inversion model

$$\theta = p_1 + p_2 \times e^{-VTCI/p_3} + p_4 \times e^{-MI/p_5}$$

VTCI-The Vegetation-Temperature Condition Indes，MI-Moisture Index，P1、P2、P3、P4 and P5-parameters on area and month

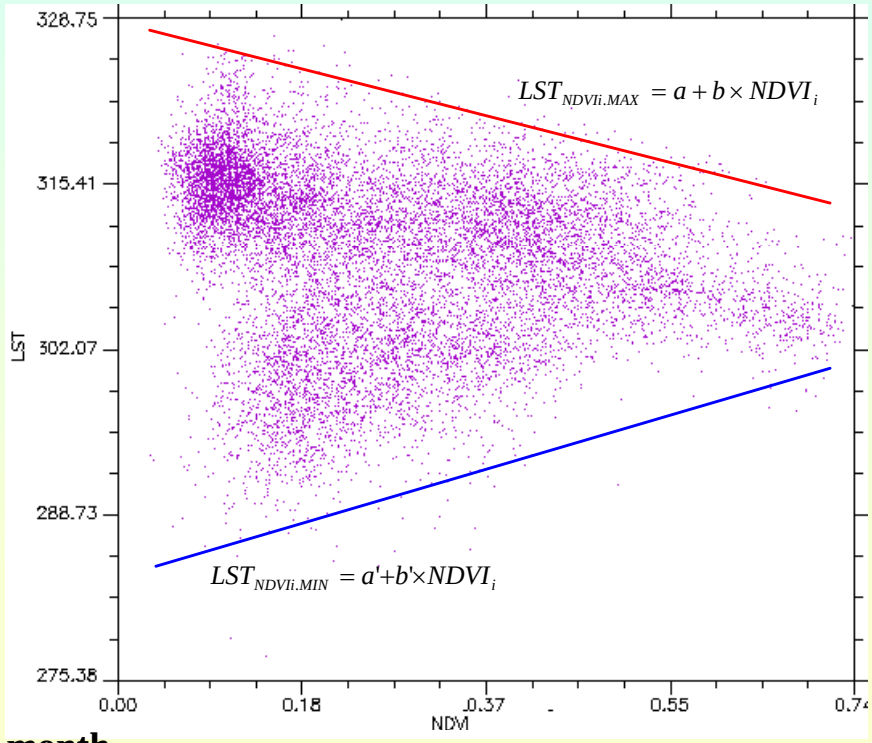
MI **is Moisture Index:**

$$MI = \frac{P}{E}$$

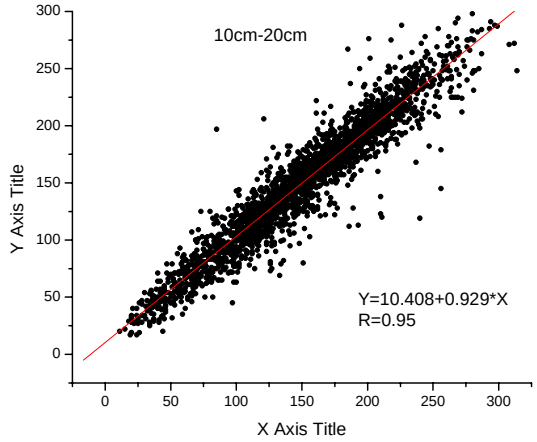
where *P* is precipitation of month and *E* is evaporation of month.

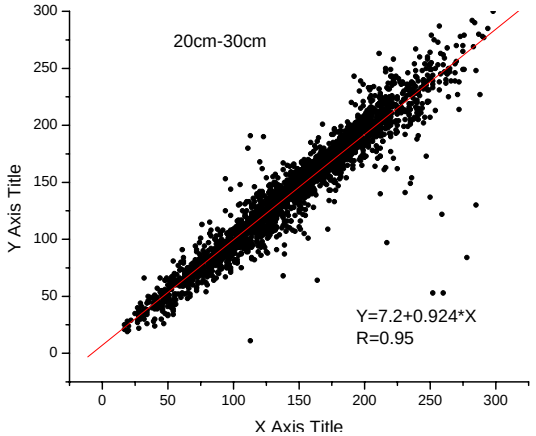
***VTCI* is the Vegetation Temperature Condition Index and its formula is:**

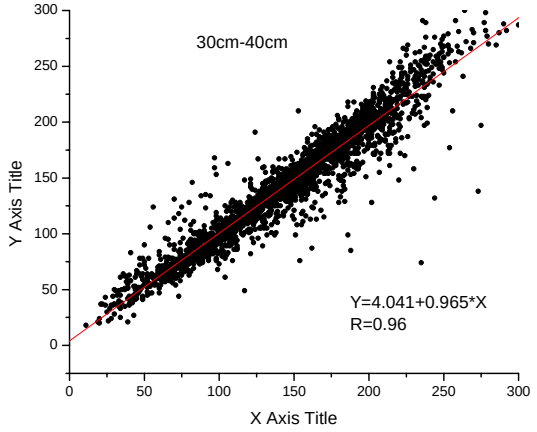
$$VTCI = \frac{LST_{NDVIi.MAX} - LST_{NDVIi}}{LST_{NDVIi.MAX} - LST_{NDVIi.MIN}}$$

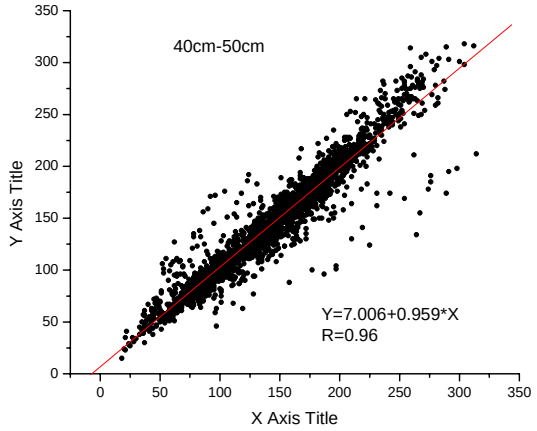


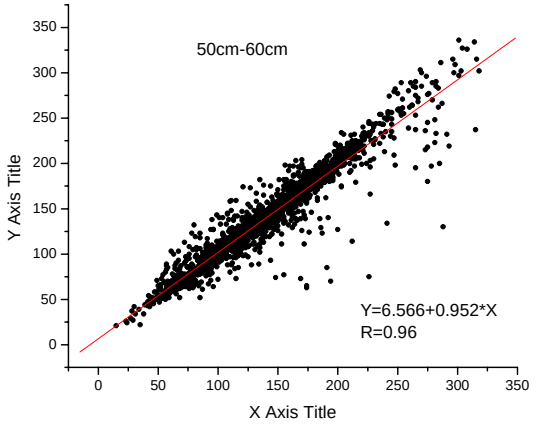
The correlation model between two Soil layer

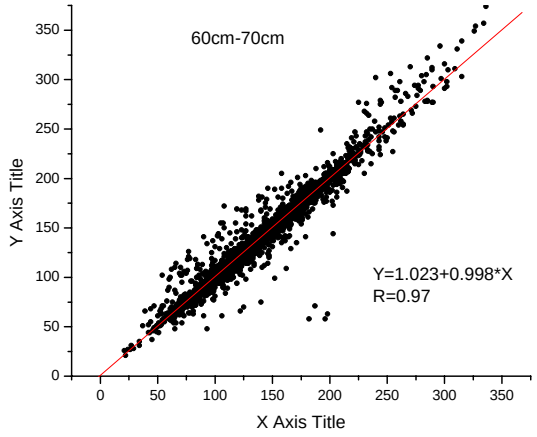


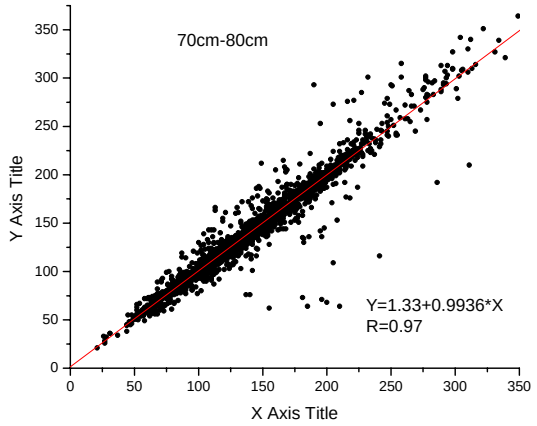


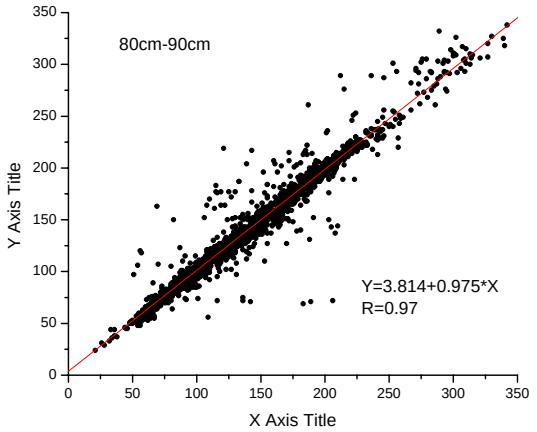


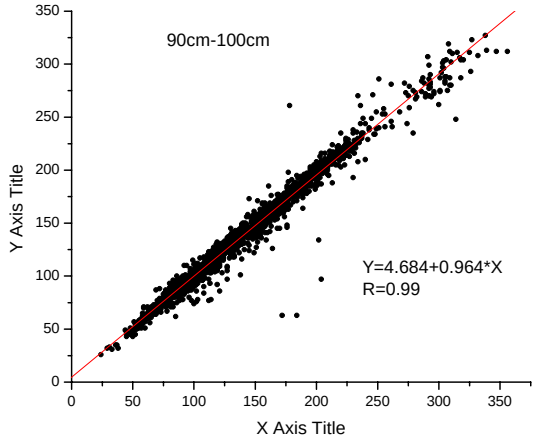




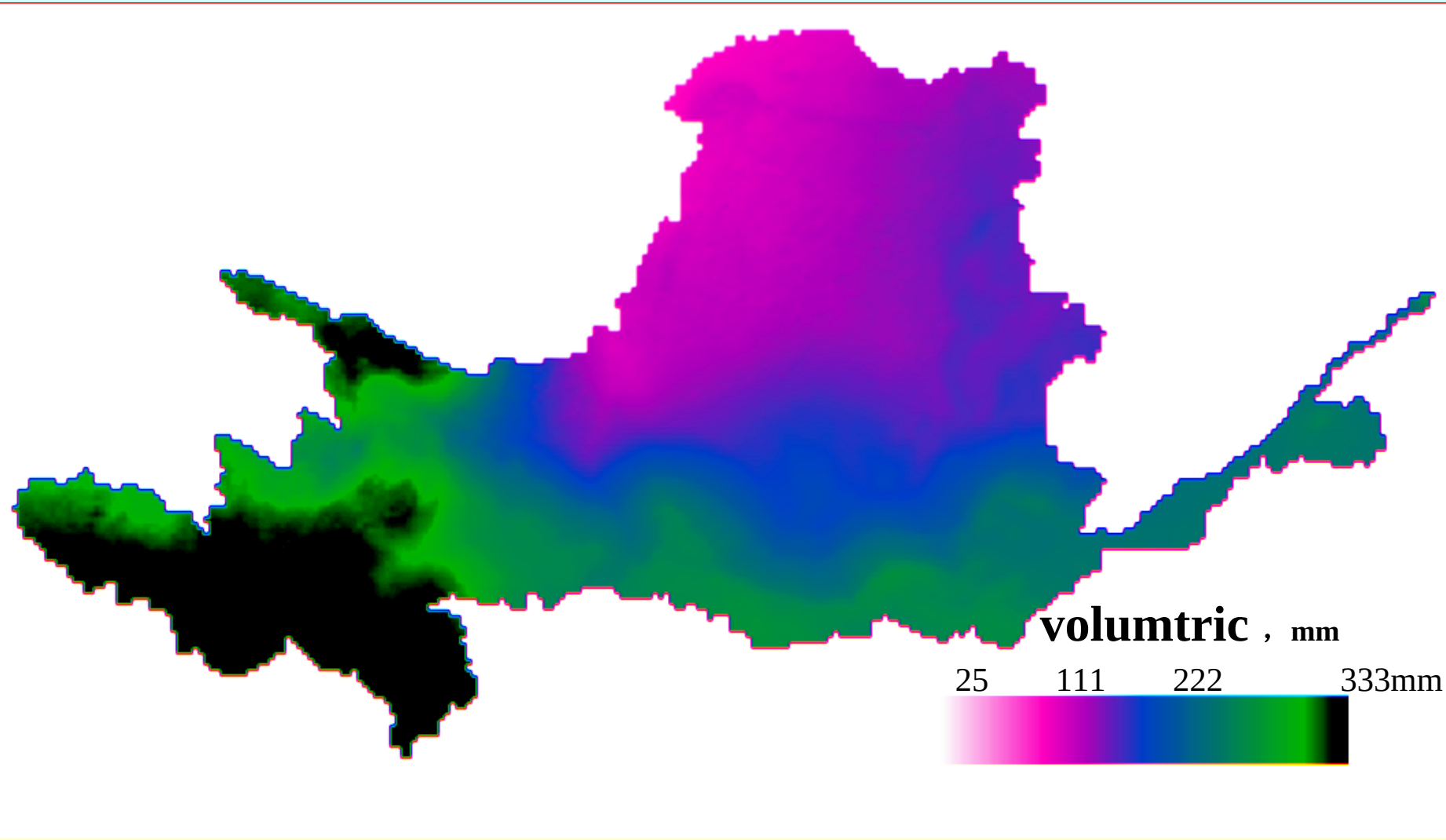








Average soil moisture distribution content in 1m profile from 1982~2000



Brief Summary

1. **Every 10cm soil moisture data in 1m profile from March to October in 1982～2000 was calculated and the dynamic change with time of soil moisture and water balance factor in sub-catchments was analyzed.**
2. **The inspecting results showed that the method could be applied to surveying the soil water for soil profile in a large scale region over a long time period from 1982 to 2000. Finally, The detected soil water validated with observations with fairly good fittings. The result is likely advisable for better understanding of the water cycle changes in a river basin.**

Secretary
Dr. Zhongli Zhu
CEOS/IGOS/GEO-CHINA Secretariat
National Remote Sensing Center, CHINA (NRSCC)
Tel:++86-10-62202239. Fax:++86-10-62202238
Email: Zhongli@ceos-china.com

Dr. Wen Wang
IRSA/CAS/NRSCC
CEOS/IGOS/GEO-CHINA
Tel:++86-10-64870453
Email:wenw@public2.bta.net.cn

IGWCO-CHINA: Chair of Scientific Advisory Group: ChangMing Liu
IGWCO-CHINA :Scientific & Technology Group

YongJiu Dia, QinHou Liu, WenJie Dong, Tiao Yu, ZaoLiang Li, Rui Sun, Wen Wang, JiXi gao, Jun Xia
ShengTian Yang, LiXin Zhang, ShaoMin Liu, JiRen Li, WeiDong Liu, GuoJun Song, LiKun Ai