

REPORT ON A SOILS STUDY TOUR TO THE PEOPLE'S REPUBLIC OF CHINA

July 31 to September 27, 1985

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<sup>1</sup> NISS = Nanjing Institute of Soil Science

AS = Academia Sinica

<sup>2</sup> ISRIC = International Soil Reference and Information Centre

KNAW = Royal Netherlands Academy of Arts and Sciences

## **1. Introduction**

Since 1980 contacts exist between the Nanjing Institute of Soil Science, Academia Sinica, and the International Soil Reference and Information Centre (formerly International Soil Museum), Wageningen. In 1983 a cooperative programme between both institutes was set up for further strengthening the scientific relations and exchanges. The present study tour through part of northwest China forms part of this cooperation.

## **2. Purpose of the study tour**

- The purpose of the present study tour can be summarized as follows:
- to study soils and agricultural practices in China, including collection of representative soil monoliths with accompanying information, to be incorporated in the ISRIC world soils collection;
  - to evaluate and advise on the existing soil monolith collection at the Institute of Soil Science, Nanjing;
  - to give lectures on soil classification, remote sensing and computerized soil data handling.

## **3. Funding**

The cooperative programme, of which the present study tour forms part, was jointly funded by the Academia Sinica (Chinese Academy of Sciences) and the Royal Netherlands Academy of Arts and Sciences (KNAW). Travel costs to and from China, acquisition and shipping costs of materials and the salary of the Dutch soil scientist were borne by the KNAW, while the Academia Sinica financed the board and lodging, and the travel expenses incurred in China.

#### 4. Itinerary

##### A. Itinerary to and from Shanghai, China:

July 31 - Aug. 1 Amsterdam - Hongkong )  
Aug. 2 Hongkong - Shanghai )  
Sept. 26 Shanghai - Hongkong ) (by air)  
Sept. 26/27 Hongkong - Amsterdam )

##### B. Itinerary of the field tours in China:

Aug. 3 Shanghai - Nanjing (by train)  
10/11 Nanjing - Xian (Wugong) (by train)  
11 Wugong - Yang Lin (by road)  
16 Yanglin - Xian (by road)  
16/17 Xian - Lanzhou (by train)  
18/20 Lanzhou - Yu-Zhong county (daily by road)  
20/22 Lanzhou - Urumqi (by train)  
24/25 Urumqi - Changyi (daily by road)  
27 Urumqi - Turpan (by road)  
29 Turpan - Urumqi (by road)  
Sept. 4/6 Urumqi - Nanjing (by train)  
20/25 Nanjing - Shanghai (by train, with two stops in Wuxi and Suzhou).

#### 5. Activities

The activities in the Netherlands at ISRIC's offices embraced the preparation, in total about two weeks, and the elaboration of all collected information including reporting from October 1 to November 15. A container with working materials, lacquers, etc., was already sent in 1983.

The soil study tour in China can be divided in 3 parts:

Aug 3 to Aug 9 Preparations and discussions in Nanjing  
Aug 10 to Sep 6 Field work in Shaanxi, Gansu and Xinjian Provinces  
Sep 7 to Sep 20 Lectures, discussions and follow-up reporting in Nanjing

During the week preceding the field trip to northwest China, I was shown around the various departments of the Nanjing Institute of Soil Science, namely Departments of Soil Geography, Soil Physical and Chemical Laboratory, Remote Sensing and the Computer group.

Discussions were held with the Heads of Departments, in particular with Prof. Zhao Qi-guo, Director of the Institute and Prof. Gong Zi-tong, Head of Soil Geography. For all persons contacted see Annex 1.

The discussions focussed on the past and present cooperation programme and on the exchange of scientific views, in particular soil classification, remote sensing and data handling with computer. The field programme and the period thereafter was established in detail. The equipment and materials for collecting monoliths was checked and missing essentials were locally purchased. As the field trip was to be made mainly by train and partly by road, the necessary equipment for collecting soil monoliths was distributed beforehand over the various institutes. The soil monolith collection tour was realized from August 10 to September 6. Throughout the field trip I was accompanied by Mr. Jiang Zeng-zi, the soil technician responsible for the sampling and conservation of monoliths, and Mr. Shih Xuez-hang, a soil scientist who did part of the translation work.

The NISS organized the field work through three associated institutes, namely:

- The North West Institute for Soil and Water Conservation, Wugong, Shaanxi
  - The Institute of Desert Research, Lanzhou, Gansu
  - The Institute of Biology, Pedology and Psammology, Urumqi, Xinjiang.
- Logistic and scientific supports were given by these Institutes.

During the soil monolith collection tour, 8 monoliths were collected, being:

Monolith number	FAO-Unesco name	Chinese Classification	Location
CHA 9	Calcaric Regosol	Lou tu (löss soil)	Xang Lin town
CHA 10	Calcic Xerosol	Sierozem	Yu-Zhong county
CHA 11	(irrigated) Xerosol	irrigated Sierozem	Yu-Zhong county
CHA 12	Haplic Yermosol	Gray Desert Soil	Chang yi town
CHA 13	(irrigated) Yermosol	irrigated Gray Deserts	Chang yi town
CHA 14	Orthic Solonchak	Salt Desert Soil	Turpan depression
CHA 15	Regosol	'Hsamo' or Desert Dune soil	Junggar desert
CHA 16	Regosol	'Gobi' or Desert Gravel soil	Urumqi

For each soil a description was made according to ISRIC-FAO standards and samples were collected for physical and chemical analyses, for thin section preparation, and for pF determination. Where necessary additional subsoil samples and parent material were collected. Informations related to the soil, environment and agriculture in the form of reports and maps were collected where available to support the soil data.

In all institutes informal meetings were held with soil scientists to discuss the sites and soils studied. These opportunities were also used to exchange scientific views on other topics such as remote sensing for soil survey and modern soil conservation techniques. In Urumqi a lecture was given on "The visual use of satellite images especially for soil mapping purposes".

Upon return in Nanjing activities focussed on the information related to the field work, the follow-up in the cooperation programme, the Nanjing Soil Reference Collection and the mode of shipment of soil monoliths and all other samples for ISRIC. In addition some lectures were given. Several discussions were held on the information aspect of the field work, in particular with Mr. Lai Wai-jing on the distribution and importance of primary and secondary löss in China.

The significance of ISRIC's LABEX programme and the Chinese procedures of laboratory analyses were discussed with the staff of the physical and chemical laboratory. One afternoon visit tour was paid to the Agrometeorology Division of the Jiangsu Academy of Agricultural Sciences where discussions were held with Mr. Li Lin and Jin Zhiqing on measurement of some meteo-elements as well as on agriculture simulation models.

The present stage of the Nanjing Soil Reference Collection was discussed. It was agreed that more information should become dispoible to visitors, particularly on the twelve newly prepared and future monoliths. Duplo's of the monoliths already collected for ISRIC will be sampled and included in the Nanjing collection. In future soil study tours, two profiles will be taken simultaneously.

At the end of September only a part of the soil materials, which were dispatched by train during the field work, had arrived in Nanjing. Sample lists and necessary documentation for shipment to The Netherlands was prepared.

A few lectures were given for the staff of some departments of NISS. The following subjects were established in discussion with the Soil Geography Department:

- World Soil Classification System (FAO-Unesco)
- Classification of red clayey soils, a case study from Mozambique
- Use of Satellite Images, especially for soil mapping purposes
- Some uses of computerized data handling in soil science.

Lecture notes were prepared in Nanjing to facilitate the simultaneous translation from English into Chinese language.

## 6. Follow-up

Follow-up activities in the cooperation programme were discussed with Prof. Zhao Qi-guo, Prof. Gong Zi-tong and Dr. Liu Guang-song.

The activities include the future soil study tours, computer-aided statistical analysis of analytical data, the exchange of soil scientists and the photography of micromorphological features.

Below the proposals for these activities will be given in broad lines, for more details see Annex 2.

- As already agreed in 1983 the soil study tours are divided over four main areas. The first two sampling tours resulted in soil profiles from southeast and northwest China respectively. Two more soil study tours are foreseen. The Chinese counterparts will try to organize a third tour through northeast China in August/September 1986. Proposed soil profiles and possible sampling sites are listed in Paragraph 2 of Annex 2. Longer-term follow-up will be a sampling trip to the Tibetan Plateau, sometime after 1986.
- For end 1985 beginning 1986 interest was expressed from Chinese side to have one or two Chinese soil scientists visiting ISRIC, one to study and to be trained in several soil classification systems and one to work on soil analysis procedures/techniques, each for a period of about 6 weeks.

- The information coming available on the soil study tours can fulfill a reference function to test old existing soil data which have been manually filed for decades. As a first step it was agreed to compare statistically the analytical results of both ISRIC and NISS laboratories. This activity will be executed by the computer sections of ISRIC and NISS.
- At the occasion of the visit of Chinese soil scientists to ISRIC the photography of special micromorphological features will be carried out.
- The possibility of the Chinese soil classification system to be published in English in ISRIC's field abstract series has been discussed and was positively received by both parties.

## 7. Acknowledgements

- I would like to express my gratitude to the Academia Sinica and Royal Netherlands Academy of Arts and Sciences for their guidance and support;
- I would like to thank the Nanjing Institute of Soil Science and the associated institutes for the fine arrangements made and for the perfect organization of my stay in Nanjing and during the extensive field trips in Shaanxi, Gansu and Xinjian Provinces;
- I would like to thank Prof. Zhao Qi-guo and Prof. Gong Zi-tong of the Nanjing Institute of Soil Science for the many fruitful discussions and for the way they made my stay at the Institute an unforgettable experience;
- In particular I would like to thank Mr. Xu Li-yu and Mr. Jiang Zeng-qi for their guidance and assistance during the field and office work.

Wageningen, 18 October 1985

J.H. Kauffman

**Annex 1 - Cooperating Institutes and persons contacted**

NANJING INSTITUTE OF SOIL SCIENCE (Nanjing, Jiangsu Province)

- Zhao Qi-guo : Director, Institute of Soil Science

Soil Geography Department

- Gong Zi-tong : Head  
- Li Jing Mrs. : Vice-Head  
- Xu Li-yu : staff member (accompanying office work)  
- Xi Cheng-fan : former Head (Beijing)  
- Dai Ching-da : Ass. professor  
- Lei Wan-jing : Desert/Löss soils specialist  
- Shih Xuez-heng : (accompanying field work)  
- Jiang Zeng-qi : soil technician (accompanying field work)

Remote Sensing

- Xu Bing-bing : Head  
- Liu Xin-wen : staff member

Soil Physics

- Yao Xian-liang : Head

Soil Ecology

- Xū Qi : Head

Foreign Affairs

- Zheng Wen-gin : Head  
- Weng Jie-ping, Mrs. : secretary

Computer Group

- Liu Guang-song : Head  
- Tang Wan-long : staff member

Micromorphology

- Cao Sheng-geng : Head

Chemical Laboratory

- Chong Guo-chu : Head



NORTH WEST INSTITUTE FOR SOIL AND WATER CONSERVATION (Wugong/Yanglin,  
Shaanxi Province)

Soil Geography Department

- Zhang Shu-guang : Head
- Wang Zhan-hua : staff member
- Liu Yuan-gao : staff member
- Tang Ke-li, Mrs. : micromorphology specialist
- Jiang Yong-qing : remote sensing specialist
- Li Ji-yun : trace element specialist

Foreign Affairs

- Zhou Zhen, Mrs. : Head

INSTITUTE OF DESERT RESEARCH (Lanzhou, Gansu Province)

- Zhu Zenda : Director
- Gao An : pedologist
- Chen Hao : foreign affairs secretary

XINJIAN INSTITUTE OF BIOLOGY, PEDOLOGY AND PSAMMOLOGY (Urumqi, Xinjian  
Province)

- Xia Xun-cheng : Director
- Cheng Xin-jun : staff member soil geography (remote sensing)
- Zhang Leids : soil technician
- Wel Lung-chin : foreign affairs

JIANGSU ACADEMY OF AGRICULTURAL SCIENCES

- Li Lin : ass. professor
- Jin Zhi-qing : senior research assistant

**Annex 2** - Follow-up activities in the cooperation programme between the  
NISS-AS<sup>1</sup> and ISRIC-KNAW<sup>2</sup>

1. Introduction

A scientific cooperation programme between NISS-AS and ISRIC-KNAW started in 1983. This programme aims at the enlargement of ISRIC's World Soil Reference Collection, the renewal of the National Soil Reference Collection (NASREC) in Nanjing and the exchanges of soil scientists.

The renewal of the NASREC in Nanjing embraces the following steps:

- updating and improvement of the present NASREC
- enlargement of the NASREC
- management of the NASREC
- display and storage of the NASREC

For more details of this activity, see the proposal drafted by Dr. O.C. Spaargaren in July 1983.

The following activities have been realized:

- Twelve new soil monoliths have been prepared with modern conservation techniques. They are incorporated in the existing exhibition. The new monoliths were well prepared and show the natural soil morphological features like structure, porosity, etc. It is proposed that the amount of information for each of the monolith be enlarged.
- In 1984 Mr. Xu Li-yu, soil scientist of NISS, attended the course on the establishment of national soil reference collections at ISRIC.
- In 1983 and 1985 two soil sampling study tours resulted in 16 reference profiles for ISRIC's world soil collection.

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- 1) NISS = Nanjing Institute of Soil Science  
AS = Academia Sinica
- 2) ISRIC = International Soil Reference and Information Centre  
KNAW = Royal Netherlands Academy of Arts and Sciences

In September 1985 follow-up activities were discussed with Prof. Zhao Qi-guo, Director of NISS, Prof. Gong Zi-tong, Head of Soil Geography Department, Dr. Liu Guang-song, Head of the Computer Group and Ir. J.H. Kauffman, soil scientist of ISRIC. These activities embrace future soil sampling study tours, computer-aided statistical analysis of analytical data and the photography of micromorphological features. Below the proposals for these activities are given.

## 2. Future soils study tours

Due to the vast area of China and the organization of the necessary logistics it has already been agreed in 1983 to divide the soil sampling programme in 4 tours of about 2 months each. The first sampling tour of 1983 resulted in 8 profiles (CHA 1 to CHA 8) in southeast China. The second tour resulted in 8 profiles (CHA 9 to CHA 16), mainly from northwest China. Two more sampling tours are foreseen in the programme: one in northeast China and one in southwest China.

In principle the third tour in northeast China should be executed in 1986 with preference for the months of August and September. The following major soil groups are proposed:

1. Black soil: Hei Long Jiang Province, the west suburb of Harbin City
2. Albic black soil: Huma County, Hei Long Jiang Province
3. Planosol: Tongbei Farm, Hei Long Jiang Province
4. Gleyic Planosol: Xingan Farm, Hei Long Jiang Province
5. Meadow bog soil: Mishan County, Hei Long Jiang Province
6. Peaty bog soil: Hulin County, Hei Long Jiang Province
7. Chernozem: 42 km north of Hailar city, Inner Mongolia
8. Chestnut soil: 120 km north of Hailar city, Inner Mongolia.

As will be discussed under paragraph 4, during the third and fourth soil sampling tours two profiles will be taken, one for ISRIC's world collection and one for NISS national collection.

### 3. Follow-up in the exchange of soil scientists

For end 1985 it is foreseen in the programme that one or two Chinese soil scientists will come to Holland. NISS will soon decide in which fields the scientists will be working.

Three fields of interests are mentioned:

1. The first priority is given by NISS to the field of soil classification systems with special attention to placing of tropical soils in such systems
2. The second priority is given methods and techniques of laboratory analyses of soils
3. Remote sensing is mentioned as future field of interest.

### 4. Statistical analysis of analytical data

The computer group of NISS has programmed for the coming years the building of a computerized Soil Information System, which should satisfy the information needs in the fields of land/soil resources and fertility status.

To test the large amount of existing manually filed soil information on its reliability, the computer group needs a reference data set, with special attention to analytical data.

The ongoing soil profile collection programme between ISRIC-KNAW and NISS-Academia Sinica can be used for this aim. Soil profiles collected for both ISRIC and NISS should be analyzed by the laboratories of both Institutes. The resulting information files can be statistically compared and as such form a reference data set to test in a pragmatic way the existing "old" soil information.

In chronological order the following activities are foreseen to reach this goal:

- Soil monolith and soil horizon sampling of the same sites and of the same horizon of the reference profiles CHA 1 to CHA 16, which have been already collected for ISRIC in 1983 and 1985. To be executed by NISS in 1985 and beginning of 1986.

- As already stated above with regard to future soil study tours, the profile and horizon sampling of another 16 profiles should be executed for both ISRIC world collection and NISS national collection.
- Soil samples will be analyzed by both laboratories according to their own procedures and when differing also by standardized methods. In principle results of the CHA 1 to CHA 16 profiles could become available in the course of 1986. For the follow-up soils study tours, soil information will be available in 1987 and later.
- The soil information of CHA 1 to 16 and especially the analytical data of both laboratories will be statistically compared by the computer sections of both NISS and ISRIC.

As soon as results of profiles of the future soil sampling tours become available this activity will be prolonged. Mr. Liu Guang-song raised also the possibility of an exchange programme for computer-specialists with experience in soil science. As this falls outside the scope of the ongoing programme, the proposal will be brought to the attention of the Dutch Soil Survey Institute (Stiboka).

#### 5. Photography of micromorphological features

The visiting Chinese soil scientists are bringing micromorphological thin sections to ISRIC to make micrographs of special features. More details on this activity will be defined by NISS.

#### 6. Publication of the Chinese Soil Classification System

The Chinese soil classification system is at the moment in an updating stage. The possibility of an English translated publication in ISRIC field abstract books has been discussed and was positively received by both parties.

Comments on the first draft of July 1985 will be made by ISRIC.

W.G. Sombroek  
Director ISRIC

Zhao Qi-guo  
Director NISS