中国科学院地理研究所　编辑

# 中国地理基础数据

## 野外定位试验站卷（第2集）

## 辐射观测数据集

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## 内 容 简 介

本书内容包括不同水分处理下麦田辐射平衡对比观测资料；浅草地辐射平衡资料；光合有效辐射资料；太阳直接辐射光谱资料和日偏食观测资料，共五个部分，收集了非常规辐射观测数据1万组。可为研究辐射气候、农田小气候、农业生态、建筑采光等领域的有关部门提供第一手资料。


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# 《中国地理基础数据》编辑委员会

# Editorial Board

# 中国地理基础数据

## 野外定位试验站卷（第2集）

## 辐射观测数据集

周允华　项月琴　编

# BASIC DATA OF GEOGRAPHY IN CHINA

## VOLUME ON
## ALLOCATED FIELD EXPERIMENTAL STATIONS
(No. 2)

COLLECTION OF RADIATION DATA

**ZHOU YUNHUA AND XIANG YUEQIN**
**(EDITORS)**

# 序

建国40年来，我国地理学研究取得了长足进展，走过了一段光辉的里程。从本世纪50年代开始，根据国家经济建设的需要，首先对所有边远地区和某些流域进行了一系列综合性科学考察和自然资源调查研究。我国地理工作者的足迹遍布青藏高原、新疆、甘肃、宁夏、内蒙古、川滇黔接壤地区、西南地区、海南岛和黑龙江流域等广大地区。通过调查与考察，搜集整理了这些地区的自然条件和社会经济条件等资料。此后，随着国土整治等工作的开展，又进行了各类专题性和特定区域的考察与研究。例如：

我国干旱、半干旱地区、黄土高原和喀斯特地区，面积广阔，具有鲜明的地理特色，区域开发和国土整治中问题较多，地理工作者对这些区域给予了高度的重视。辽河中下游、京津唐地区、黄淮海平原、长江中下游和珠江三角洲是我国经济和文化最发达的地区，对这些区域的开发与治理，也进行了广泛的研究。

在水土资源调查、评价与合理利用和保护的研究、农业生产的合理布局、中国综合农业区划和地区农业区划等方面，也进行过大量的工作。根据国家经济建设的需要，地理学界还对我国重点开发地区和重大工程项目的地理学问题，例如对东北、华北、西南地区和沿渤海湾地区若干工业基地的选择以及工业、交通、城镇体系的布局，进行了较多的研究。

在环境方面，开展了环境背景值、环境容量、环境影响评价和环境治理对策的研究。对与生命有关的化学元素及某些地方病环境病因的研究等，也进行了近20年的工作。

我国地理学界对全国的地貌、水文、气候与地理环境的演变以及湖泊、沼泽、海涂、冰川和冻土等也进行了长期、大量的调查、考察研究，对土地沙漠化的防治以及滑坡与泥石流的防治和预报，开展了面上调查和点上试验相结合的研究。

为了了解自然地理现象的形成、发展与变化的动态过程，并研究产生这些过程的条件、内因和外因，以及过程进行中物质运动和能量转换的形式和量级，地理学界按照不同的研究内容与目标，设置了一些野外定位与半定位试验站和室内模拟实验室。同时普遍加强了地理学的室内分析与测量手段。

上述地理工作，都获得了丰富的第一手资料。这些资料都来之不易，是广大地理工作者长期进行野外工作和室内分析实验取得的。为了探讨地理现象和地理动态过程的规律性，一般还对原始资料进行分析加工，因而形成大量的二次数据。所有这些资料和数据，以及遥感、地图量算和从历史文献档案中摘录的资料等，不仅是当前和今后经济建设所必需，而且

也是地理教学所必需，其中不少资料还可供给其它自然科学和社会科学研究者所应用。与此同时，这些资料数据对地理学本身的理论研究、应用研究和使地理学向定量化方向发展，也将会做出有益的贡献。

当前，这些资料与数据大多分散在各个研究集体和个人手中。而计划与规划部门、生产部门和科研教学人员为了查找某些地理数据及其出处，需要翻阅许多资料与文献。这种状况影响了研究工作效率的提高和出成果的周期，很不适应我国四个现代化建设的需要。因而将这些宝贵的而又分散的，有些甚至是唯一的数据系统地收集、整理、编辑、出版和储存，使它们变为社会共享的科学财富，就显得十分必要而有意义了。这就是编辑出版《中国地理基础数据》系列集的目的。

本数据系列集拟按学科分卷收编中国自然地理、地貌、历史气候、水文地理、化学地理、地图、西北地区地理环境变迁、树木年轮数据以及有关野外定位站观测数据（包括德州试验站水量平衡观测数据、北京农业生态系统试验站及其他有关站点的太阳辐射观测数据、陕西黄龙站森林水文、径流观测数据、水热平衡与农业生产潜力观测数据）、有关区域地理数据（如黄淮海地区，青藏高原地区）等。各卷以中、英文对照方式公开出版。

左大康　杨淑宽

1989年

# Preface

In the last forty years since the founding of the People's Republic of China a great deal of work on economic construction has been done by the Chinese geographical workers. Starting from the 1950s, they have been participating in comprehensive surveys and resources investigations in all remote areas and part of drainage basins. Their footmarks were left over the Qinghai–Xizang Plateau, Xinjiang, Gansu, Ningxia, Neimongol, contiguous area of Sichuan and Yunnan, southwestern region, Hainan Island and Heilongjiang Drainage Area. Based on these activities, data on natural and socio–economic conditions of these regions were collected and compiled and many monographs in this connection have been resulted.

China has vast expanse of arid and semiarid, loess and karst regions which possess distinct geographical features along with numerous problems on regional development and terrestorial management. Great importance of these regions has been pointed out by geographic workers. They have carried out fairly extensive research relevant to regional development and management in the economically and culturally most developed regions in China including the middle and lower reaches of Liaohe River, Beijing–Tianjin–Tangshan Region, Huang–Huai–Hai Plain, middle and lower reaches of the Changjiang River and Zhujiang Delta.

Research on water and soil resources investigation and evaluation as well as rational utilization and protection has always been a subject dealt with by geographical circles over a long period of time. Substantial work on rational distribution of agricultural production, comprehensive regionalization of agriculture, and agricultural regionalization of various regions have also been conducted. In order to meet the need on national economic construction, much more research work on geographical issues concerning important areas for development and key projects such as selection of several industrial bases in areas of northeast, north and southwest of the country as well as location of industrial, transportation and urban systems has been done and a considerable amount of data has also been accumulated.

Regarding environmental aspect, studies on environmental background, environmental capacity, environmental impact assessment and environmental management strategy have been made. Studies on chemical elements related to life and pathological studies of some endemic disease have been carried out for nearly 20 years with a wealth of data accumulation.

Over years, the geographical circles were engaged in nationwide investigations and surveys and substantial studies on geomorphology, hydrology, climate and geographical environmental evaluation as well as lakes, swamps, marshes, glaciers and frozen ground. A great amount of valuable data on desertification prevention and control as well as prevention and prediction of landslides and mud–flows were obtained via investigations on areas combined with site experiments.

For the purpose of gaining knowledge on dynamic processes of formation, development and changes of physical geographical phenomena, studying conditions, internal and external causes accounted for these processes, forms and dimension of ongoing mass movement and energy conversion in the processes, geographical circles, in accordance with different research tasks and objectives, have established a number of fixed–site or half fixedsite experimental stations and simulation laboratories. Mean while, efforts have been made generally to strengthen geography–related analytical and measurement work in laboratories.

Abundant first–hand data were gained as a result of the above–mentioned geographical work. These data were not easy to obtain. They were obtained through years of arduous field work, laboratory analysis, and experiments by broad geographical workers. In order to explore geographical phenomena and regularity of geographical dynamic process, the original data were normally analysed and processed to form substantial secondary data. These document and data together with remote sensing data, cartographic measurement and calculation as well as data extracted from historical document and records, are not only necessary for current and future economic construction but also necessary for geographical teaching and further geographical research. Many of them are also useful for studies on other subject areas of natural and social sciences. Mean while, these measurement and analytical data are expected to make valuable contributions to theoretical studies of geography, applied research and to bring geography onto quantitative development.

Presently, most of the discussed documents and data are scattered in various research organs and individuals, therefore, large amount of documents and literatures have to be gone through in case relevant geographical data and their sources are needed by planning department, industrial sectors, scientific personnel, teachers and technical staff. This situation is not suitable for meeting the needs on the realization of four modernizations in China because it has seriously affected work efficiency and delayed the publishing date of research results. It is thus quite necessary and essential to have these scattered valuable data, some even being the only available data systematically collected, processed, compiled, published and stored, and make them the common scientific wealth to society. This serves as a sole explanation of the aim in compiling and publishing the present collection of basic data series of geography in China.

The compilation of the whole set of data series will be carried out in subjects covering

physical geography of China, geomorphology, climate, hydrography, chemical geography, cartography, and evolution of geographical environment of Northwest China. Tree ring data, and observational data were obtained from relevant fixed–site stations such as water balance observational data of Dezhou Experimental Station, radiation data of Beijing Agro–Ecosystems Experimental Station and other stations, forest hydrographical data of Huanglong Station, Shaanxi Provience, runoff data, water–heat balance and agricultural production potential, and radiation data as well as geographical data of relevant areas including Huang–Huai–Hai Region and Qinghai–Xizang Plateau. Each volume will be published in Chinese and English.

Zuo Dakang and Yang Shukuan
1989

# 前　言

太阳辐射能对于农业生产以及对国民经济其他各个领域都具有十分重要的意义。本集《中国地理基础数据》主要搜集介绍中国科学院北京农业生态系统试验站的观测试验资料与数据。该站的重要任务之一是研究华北地区的农业增产潜力和探讨解决缺水问题的途径。其中观测工作包括太阳辐射能和农田辐射平衡的测定等。太阳辐射能的测定，可为光合生产潜力的研究提供基础资料，而农田辐射平衡的测量，则为农田微气象学特征和水分耗损的研究提供最重要的数据。

随着我国国民经济建设的发展，对日射观测工作也提出了新的要求。例如，太阳能的利用及光电转换效率的计算，太阳能的模拟试验，高分子聚合物老化效应的研究，建筑学上采光的设计，以及医药卫生和环境保护，遥感技术应用等等，不仅需要知道太阳辐射在全波段的能量，而且还要求了解某些特定波段的光谱辐射能量及其随时间、空间和随气象条件变化的规律。

北京农业生态系统试验站，集中了一批有长期研究经验的专业人员和训练有素的观测人员，配备有一批性能良好的辐射仪器，长期以来，对太阳辐射和地面长波辐射作了系统的观测，取得了一批珍贵的非常规观测资料。其实早在1966年珠穆朗玛峰科学考察期间，中国科学院地理研究所的科学工作者就在该地区开展了太阳直接辐射的光谱测量。以后，又在全国各类地区陆续进行了观测，至今已积累了13个地区的太阳直接辐射光谱资料，其中北京的观测，时间长达3年之久，资料尤为宝贵。

在这里我们要特别感谢中国科学院自然资源综合考察委员会张炯远和李继由同志，他们分别为我们提供了有关拉萨的和昌都的太阳直接辐射光谱观测资料。

搜集在本资料中的多种辐射观测数据近1万组。它们大多数都被作过细致的分析和研究，证明是合理的和可用的。根据这些资料，已完成并公开发表的专题学术论文30余篇。其中，有关太阳直接辐射的光谱测量及其应用的研究，曾获中国科学院1979年科技成果奖；有关太阳紫外辐射和光合有效辐射的气候学研究，曾获中国科学院1986年科技进步奖。

这里刊出的资料是集体劳动的结晶。参加观测的人员按时间先后有童庆禧、鲍士柱、项月琴、周允华、谢贤群、单福芝、田国良、朱志辉、周树秀、张炯远、李继由、赵文广、董颜、于沪宁、董振国、王淑清、王淑华、徐兆生、李建京等人。此外还有不少地方气象台站的观测人员也参加了太阳直接辐射的光谱测量。

本资料由周允华和项月琴负责审核和整编，并承左大康和杨淑宽同志对文字说明和资料进行了审阅。

# Foreword

Solar energy is very important to agricultural production as well as the other realms of national economy. The Collection of Basic Data of Geography in China maily relates the data obtained from Beijing Agro–Ecosystems Experimental Station, the Chinese Academy of Sciences. One of the main research tasks of the Station is to deal with two problems: researching agricultural potential productivity and seeking method of solutions to agricultural water shortage in North China Plain by means of field experiments. The measurement of solar radiation energy is going to provide data background for studying the photosynthetically potential productivity. And the measurement of net radiation over the crop field is to provide data background for studying the feature of micrometeorology and the water consumption in the crop field.

With the developing of national economy the new requirements on radiation measurement are presented. For example, the use of solar energy and the calculation of efficiency of light–electrical converting, the simulating experiment of solar energy, study on ageing response of materials of high polymer, design of day–lighting in architecture, medicine and hygiene, environmental protection, and the application of remote sensing technique etc. It is not only required to know the energy of solar radiation in the whole short wave band but also the one in specified sub–wave bands, and the change of the solar energy with temporal, space and the meteorological conditions.

In the Beijing Agro–Ecosystems Experimental Station there are a number of staff members with sound background in research and much experience in practice. A set of radiometers at well operational status is equipped. A series of well designed field experiments on solar radiation and long wave radiation near the ground surface have been conducted for a long period of time. A large number of valuable data are obtained. Actually as early as in 1966 during the scientific survey in the region of Mount Qomolangma the measurements of solar direct spectral radiation were made by the staff of Institute of Geography, Chinese Academy of Sciences. Since then the similar observation has been made in the representative regions over China. Up to now, the data of solar direct spectral radiation in thirteen representative regions in China have been accumulated. Among these, the observations in Beijing have been made for three years. Thus this set of data is even much appreciable.

Here we are greatly indebted to Mr. Zhang Jiongyun and Associate Professor Li Jiyou, Commission for Integrated Survey of Natural Resources, Chinese Academy of Sciences, for

presenting data of solar direct spectral radiation in Lhasa and Qamdo, respectively, in Tibet.

In this collection there are about ten thousand sets of different radiation data to be provided. Most of the data have been analyzed and examined precisely. It shows that these data are reliable and feasible. Up to now, twenty-five research papers in total have been published based on these data. Among these, the papers on a topic of measurements and applications of solar direct spectral radiaton won a prize of scientific and technical achievements of the Chinese Academy of Sciences in 1979. And a topic on climatic study of solar radiation in the ultra-violet and photosynthetically active wave bands won a prize of scientific and technical developments of the Chinese Academy of Sciences in 1986.

The data presented in this collection are a crystallization of many people's devotion. The people, who have taken part in the observations according to order of priority of join time, are Tong Qingxi, Bao Shizhu, Xiang Yueqin, Zhou Yunhua, Xie Xianqun, Shan Fuzhi, Tian Guoliang, Zhu Zhihui, Zhou Shuxiu, Zhang Jiongyun, Li Jiyou, Zhao Wenguang, Dong Yan, Yu Huning, Dong Zhenguo, Wang Shuqing, Wang Shuhua, Xu Zhaosheng and Li Jianjing. Besides them staff in some local meteorological stations were also involved in the measurements of the solar direct spectral radiation.

Zhou Yunhua and Xiang Yueqin are responsible for examining and editing all of the data and writing the exposition. The exposition and the data are commented and approved by Zuo Dakang and Yang Shukuan.

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