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周口店野外实践教学基地

经典地质现象图册

Atlas of Classic Geological Phenomena in the Zhoukoudian Field Practical Teaching Base

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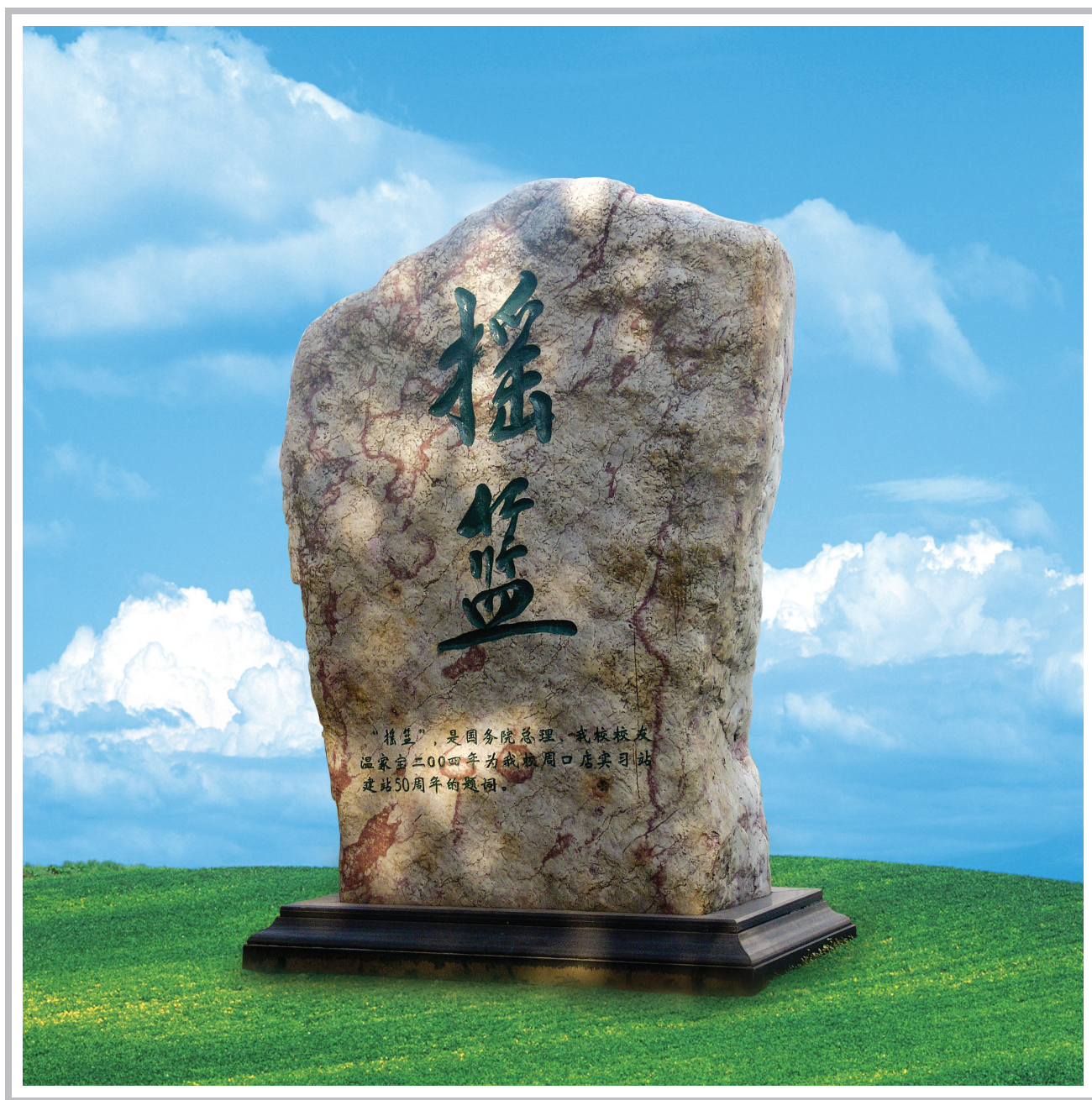
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中国地质大学(原北京地质学院)1960级校友、国家总理温家宝在校八年的学习期间,曾五次到周口店实践学习。2004年7月17日,中国地质大学隆重举行周口店实习站建站五十周年庆典活动,总理温家宝同志亲笔题字“摇篮”以示祝贺,是对周口店野外实践教学的充分肯定和殷切期望。

The prime minister Wen Jiabao, graduated from Beijing Institute of Geology (former name of China University of Geosciences), came five times to Zhoukoudian for field practice and learning during his eight-year education in our university in 1960s. On July 17th, 2004, the 50th anniversary of the establishment of the Base, the prime minister Wen Jiabao autographically inscripted "Cradle" (Yaolan) as a felicitation, which expresses his satisfying affirmation and eager expectation for the Zhoukoudian field practical education.

华夏古今
铭慰
宗摇
寻篮
考古地质

柳遵仪
2004.5.10.

庆祝周口店实习站
建站五十周年

实践出真知
精英的摇篮

杨起
二〇〇四

地质摇篮

殷鸿福
2004.5.9

周口店实习站地处西山位处通衢

建五十周年系史及学子返万

敬书致贺

千度既刚百造制固师弟

俯业半世纪

追踪亿万年

地学聖区人委搖籃演變

王鴻禛

二〇〇四年五月

塑造地質人生
的起矣
鍛造地質品格
的熔爐

周口店实习站
建站五十周年
纪念

趙鵬大

二〇〇四年五月

院士为周口店实践教学基地题词

Inscriptions to the Zhoukoudian Field Practical Teaching Base by academicians

希望我校周口店地质工作者
的摇篮不断培养出世界一流的
地质人才。

於学文

2004.06.01

庆祝中国地质大学周口店教学实习基地
建立五十周年

地质英才启蒙的窗口，
地质栋梁培育的摇篮。

祝愿实习基地在科学化、现代化的道路上
取得更大的胜利！

张本仁

2004年5月9日。

借天地造化之奇

育千万地质英才

莫宣学

二〇〇四年五月

精细观察 见微知著
缜密思考 溯本求源

发扬周口店站的科学

精神和优良传统

翟裕生

二〇〇四年

五月四日

天道酬勤
自强不息。
求真致用
学术为先。

金振民

二〇一〇年五月十九日

序一

周口店位于华北板块中部,处于太行山脉和燕山山脉枢纽处,保存了从太古代到新生代的地层序列。漫长的地质历史和多次的地壳运动造就了形态迥异的地貌单元、种类繁多的岩石类型和奇特丰富的构造现象,著名的周口店“北京人遗址”被联合国确定为“世界自然与文化遗产”而享誉世界。

周口店是我国地质研究史和教育史的一片圣地。自1954年被誉为“地质工作者摇篮”的中国地质大学(原北京地质学院)周口店实习基地建站以来,这里培养了数以万计的学生。他们在周口店接受了地质启蒙教育和野外生活的挑战后,奔赴祖国建设的各条战线,从中涌现出了包括党和国家领导人、数十名中国科学院和中国工程院院士、数百名资深地质学家和教育家在内的无数杰出人才,取得了辉煌的成果。

50多年来,在各级领导和师生的共同努力下,经过不断探索、改革和创新,逐步形成了注重理论与实践相结合、敢于探索、一切从严重的具有周口店特色的野外实践教学方法,培养了师生们团结协作、艰苦朴素、勇于创新的工作作风。周口店实习基地成为中国地质大学人才建设的培养基地。

近年来,到周口店进行野外地质实践教学的师生人数不断增加,仅中国地质大学(武汉)每年就有近千名师生在此实习,此外还有中国地质大学(北京)、中国石油大学、中国矿业大学、中国科技大学、河南理工学院等兄弟院校的师生来此进行为期不等的地质实践教学,各地质现象观察点显得日益拥挤。同时随着当地对山体资源的逐步开发,许多经典地质现象开始遭到不同程度的破坏,对野外地质实践教学造成了不利影响。为了满足教学需要,使教师和学生可以在野外路线教学之后的室内整理阶段能身临其境般地进行详细讲解和回顾,同时也为了使这些具有历史传承和地质美学意义的地质现象能够被更多的人所认识,在赵俊明老师等的共同努力下,出版了这本《周口店野外实践教学基地经典地质现象图册》。

本书以周口店野外实践教学大纲为框架,分为地层古生物、岩石矿物、构造、第四纪地质及地貌和资源与环境五个部分,囊括了每条教学路线的观察点,同时还对非教学路线上的经典地质现象一一做了收录。该书以精美的图片为骨干,配以详细的文字描述和解说,使读者仿佛置身于周口店的大山中,既欣赏了大自然鬼斧神工般的地质奇观,又掌握了科学知识。同时,对于地层学、构造地质学、岩石学等课程的室内教学来说,本书丰富的实例图片,也对课堂理论讲授起了很好的互补作用。

可以相信,本书的出版将给周口店野外地质实践教学起到极大的帮助,使师生们随时随地可以通过本书,对每条教学路线和各种地质现象进行复习和巩固,达到了将大山搬进课堂的效果。

中国科学院院士
中国地质大学(武汉)教授

殷鸿福

2010年6月18日

PREFACE

Zhoukoudian located at the junction of Taihang Mountain range and Yanshan Mountain range in the central North China Craton, preserves stratigraphic sequences ranging from the Archean to the Cenozoic. Long geological history and several episodes of crustal movements created a wide variety of landscape units, rock types and peculiar tectonic phenomena. The world-famous "Peking Man Site" in Zhoukoudian has been inscribed in the world natural and cultural heritage list by the UNESCO.

Zhoukoudian is a "holy land" in the history of China geological research and education. Tens of thousands of students have been educated since the Zhoukoudian field practice teaching base that is known as the "cradle of geologists" was founded by China University of Geosciences (former Beijing College of Geology) in 1954. With primary geological education and living challenges in the field in Zhoukoudian, the graduates went to various front lines of the construction for our motherland, and achieved outstanding successes. Among them dozens have become academicians of the Chinese Academy of Sciences and the Chinese Academy of Engineering, and hundreds have become senior geologists and educators. A great number of excellent graduates have played active roles as major leaders in the Party and government.

For the past over 50 years, with persistent reform, innovation and exploration, a characteristic teaching method for the field practice in Zhoukoudian has been formed under joint efforts of teachers, students, and leaders at all levels. It[AW1] emphasizes the combination of theory and practice and of exploration and strict training, and trains teachers and students of the work style of unity and cooperation, plain living and innovation. The Zhoukoudian field practice teaching base has become a talent training base of China University of Geosciences.

In recent years, more and more students and teachers come to Zhoukoudian for geological field practice. Nearly a thousand students from the China University of Geosciences (Wuhan) alone come here every year. In addition, students and teachers from other universities such as China University of Geosciences (Beijing), China University of Petroleum, China University of Mining and Technology, University of Science and Technology of China, Henan Polytechnic University also conduct field practice here for different periods. So, teaching sites for geological phenomena are increasingly developed. However, with the local government exploitation of mountain resources step by step, many classic geological phenomena have suffered varying degrees of damage, which led negative impacts on geological field practice teaching. To satisfy teaching needs, allow students and teachers to review field phenomena indoors, and make geological phenomena with historic heritage and geo-esthetic significance known to more people, the "*Atlas of Classic Geological phenomena in the Zhoukoudian Field Practical Teaching Base*" is published with joint efforts of Zhao Junming and other teachers.

Based on the Zhoukoudian field practice teaching program, the atlas mainly consists of five parts: Stratigraphy and Paleontology, Rocks and Minerals, Structural Geology, Quaternary Geology and Geomorphology, Resources and Environment, covering not only observation sites of each teaching route, but also geological phenomena of non-teaching routes. With colorful pictures as the main body, which are accompanied by detailed text descriptions and explanations, the atlas brings readers feeling as if being in the mountains of Zhoukoudian, and appreciation to geological wonders created by nature while mastering scientific knowledge. In addition, the atlas is rich in example pictures and is a nice complement to theoretical teaching indoors for subjects like Stratigraphy, Structural Geology and Petrology.

I believe that the publication of the atlas would be of great help to Zhoukoudian geological field practice teaching. Teachers and students can review and consolidate understanding of all of the geological phenomena in each teaching route anytime and anywhere, which accomplishes the effect of "bringing the mountains into the classroom".

Academician of Chinese Academy of Sciences
Professor of China University of Geosciences (Wuhan)

Yin Hongfu
June 18, 2010

序二

周口店野外实践教学是中国地质大学最具传承、最有特色的教学内容。周口店地区特殊的地理位置与地质构造单元,成就这里具有得天独厚的地质现象与地理景观,岩类齐全,构造现象丰富,华北地区寒武纪以来的典型地层稳定,在时间上、空间上的地质演化与发展极具代表性,是我国地质类基础教学难得的野外实践基地。20世纪50年代初,前苏联地质学家帕夫林洛夫、中科院院士池际尚、马杏垣等老一辈地质学家在周口店开展野外教学实习,拉开了北京地质学院(中国地质大学前身)周口店实习基地建设的序幕。50多年来,超过4万名学生在此参加过野外实习,为国家输送了包括国家领导人、数十名两院院士、国家优秀登山运动员等在内的无数杰出人才。只要参加过周口店实习的每个地大毕业生,都会在心中对周口店实习留下深深的印迹,并成为一生中最值得怀念的一段时光。2004年周口店实习基地庆祝建站50周年之际,曾经五次在周口店地区实习的校友温家宝总理欣然题写了“摇篮”两字,以表彰周口店实习站为中国地质事业做出的贡献。

周口店野外教学具有实践性强、理论知识与野外地质现象之间具有很强对应性等特点,对学生牢固掌握野外地质技能、学习巩固专业知识具有很好的效果。因此,自建站以来一直受到学校的高度重视。中科院院士杨遵仪、王鸿祯、赵鹏大、殷鸿福、於崇文、金振民等都曾亲临周口店授课,学校领导每年都去实习站关心与指导。经过一代又一代地质学家多年的摸索总结,形成了严谨探索、循序渐进、反复实践与认识的教学方法,培养了学生艰苦朴素,团结协作、勇于创新的思想作风与工作作风。

进入21世纪,如何切实保障野外实践教学质量,不断提高野外实践教学水平,培养适应现代地质工作的野外基本工作技能,成为我校周口店野外教学实践工作的重中之重。为了进一步丰富周口店野外地质教学资源,为教师、学生提供更为典型、直观和鲜明的图片资料,以赵俊明教授为负责的课题组,历时三年,终于将《周口店野外实践教学基地经典地质现象图册》在中国地质大学建校60周年暨周口店建站58周年前夕呈现给大家。按照周口店野外实践教学大纲的要求,该图册将周口店经典地质现象一一整理成册,以精美的野外照片为主,分为地层古生物、构造、岩石矿物、第四纪地貌以及资源与环境五个部分,涵盖了包括所有教学路线在内的经典地质现象,并配有详细的文字介绍。该图册是地质学、地球化学、资源勘查、水文地质、地质工程、石油工程等专业学生在周口店野外实习期间良好的辅导教材,将为师生进行实习前的资料熟悉、实习期间的认真比对、实习后期的资料整理发挥重要作用。同时,书中编录的地质现象都具有典型意义,在普通地质学、地质学基础、构造地质学、地史学、地层古生物学等地质基础课程教学中也可以起到很好的补充作用。

该图册的出版,进一步完善了我校地质专业实习教材体系,给我校参加实践教学工作的师生带来极大的帮助,对周口店野外地质实验教学示范中心建设具有积极的促进作用。同时,也凝聚了“图册”课题组老师们对周口店野外地质实践教学基地建设的心血、对培养优秀地质人才的热切期盼。我想,阅读过此图册的教师和同学们都会对他们表示敬意。

中国地质大学(武汉)教授

欧阳建平

2010年7月16日

PREFACE

The Zhoukoudian field practice teaching is the most traditional and distinctive teaching content in China University of Geosciences. The Zhoukoudian area has unique geological phenomena and geographical landscape, a large number of different types of rocks and a wealth of geological features due to its unique geographical location and geological structure units. Typical strata of the North China since the Cambrian are well distributed and its geological evolution and development in time and space is highly representative. So Zhoukoudian is a rare field practice base for basic geology teaching in our country. In the early 1950s, Chi Jishang and Ma Xingyuan, academicians of the Chinese Academy of Sciences, and В.Н.Павлинов, former Soviet geologist, and other geologists of the older generation carried out field practice teaching in Zhoukoudian, which pioneered for Zhoukoudian practice base construction of Beijing College of Geology (now China University of Geosciences). In the past over 50 years, more than 40,000 students have participated in this field practice, and many of them became outstanding talents including national leaders, dozens of academicians, elite climbers of China, etc. Any graduate of our university who has participated in the Zhoukoudian field practice would place it firmly in mind and never forget the most memorable time of their lives. On the celebration of the 50th anniversary of the Zhoukoudian Practical Station in 2004, our schoolfellow and the State Premier Wen Jiabao who has practiced in Zhoukoudian for five times readily handwrote an inscription "cradle", recognizing the contribution of the Zhoukoudian Practical Station to geology in China.

The Zhoukoudian field teaching has many characteristics, such as strong practicality and strong correspondence between theoretical knowledge and field geological phenomena, which are very helpful for students to grasp geological field techniques and professional knowledge firmly. Therefore, since it was founded, the station has been highly valued by the university. Academicians of Chinese Academy of Sciences, Yang Zunyi, Wang Hongzhen, Zhao Pengda, Yin Hongfu, Yu Chongwen, Jin Zhenmin and so on have come to teach at Zhoukoudian successively, and university leaders come to the station to provide care and guidance every year. After many years of exploration and analysis by generations of geologists, a teaching method which emphasizes rigorous exploration, steady progress, repetitive practice and cognition has been formed and has fostered thinking and work styles of students to be hardworking and plain-living, cooperative and innovative.

In the 21st century, how to effectively guarantee the quality and continuously improve the level of field practice teaching to train students with basic field skills needed in modern geological work is the most important aspect of the Zhoukoudian field practice teaching of our university. To further enrich the Zhoukoudian geological field practice teaching resources for teachers and students with more typical, direct and sharp pictures, a team led by Professor Zhao Junming finally presented the "*Atlas of Classic Geological phenomena in the Zhoukoudian Field Practical Teaching Base*" to us on the eve of the 60th anniversary of China University of Geosciences and the 58th anniversary of the Zhoukoudian practice station after three years of hard work. In accordance with the requirements of Zhoukoudian field practice teaching program, with colorful field pictures as the main body, accompanied by detailed text descriptions and explanations, the atlas has recorded every classic geological phenomenon in Zhoukoudian, including those in teaching routes; it mainly consists of five parts: Stratigraphy and Paleontology, Structural Geology, Rocks and Minerals, Quaternary Strata, Resources and Environment. The atlas is a good supplementary book for students majoring in geology, geochemistry, resource exploration, hydrogeology, geological engineering and petroleum engineering to do field practice in Zhoukoudian. It would play an important role in helping students and teachers to know data before practice, compare data during practice, and compile data after practice. Meanwhile, it is also a very good supplement for basic geological courses such as Physical Geology, Basic Geology, Structural Geology, Historical Geology, and Stratigraphic Paleontology as geological phenomena recorded in the atlas have typical significance.

The publication of the atlas further improves the teaching material system of geology practice of our university, provides tremendous help for our students and teachers who participate in practice teaching, and has a positive role in promoting the construction of Zhoukoudian geological field practice teaching demonstration center. The atlas also embodies the endeavor of teachers in the team to construct Zhoukoudian geological field practice teaching base and the expectations of them to cultivate outstanding geological talents. I think all the students and teachers who have ever read the atlas would appreciate them.

Professor of China University of Geosciences (Wuhan)

OuYang Jianping
July 16, 2010

前言

位于北京市中心城区西南约 45 千米的周口店及周边地区,因其独特的大地构造属性,在漫长的地史演化过程中,由内外动力地质作用铸就了诸多地质现象。在一个相对不大的范围内(约 350 平方千米),出露了类型齐全、数量众多,且具有典型意义的地质遗迹。该地区地学研究、地学教学资源得天独厚,加之区位优势 and 便利的交通条件,为我们提供了一个难得的野外实践教学场所。

最早研究包括周口店在内的北京西山地区地质的是美国地质学家庞派来(R.Pumpelly, 1867 年),我国最早的地质专修班在此进行野外实习(1914 年)。中国地质大学(原北京地质学院)于 1954 年在周口店创建野外实践教学基地,在 50 余年的历程中,广大师生员工艰苦奋斗克服重重困难潜心钻研,在教学、科研、人才培养等方面成绩斐然,为培养出数十名中国科学院院士及党和国家领导人、数百名著名地质学家和教育家、数以万计地学人才发挥了举足轻重的作用,周口店实习基地堪称地质科技工作者的摇篮。

为了更好地发挥周口店地区地质遗迹的教育功能,给“摇篮”增添光彩,我们在总结前人成果的基础上,利用影像具备直观性、可读性、视觉冲击力强的优势,借助影像技术手段,拍摄和收集了大量的经典地质现象图片,并配以简明扼要的文字阐述,以图文并茂的方式揭示地质现象特征及科学内涵。本书作为周口店野外实践教学图像辅导教材,有助于教师野外教学,有助于学生理解地质知识以及室内复习加深印象,巩固野外学习效果。

本图册由赵俊明、袁晏明负责体系设计与统编。图片摄制与收集由赵俊明在曾广策、章泽军、袁晏明、秦松贤、徐冉、李长安等实习教师带领下完成,文字描述分别由赵俊明(前言、第一部分、第六部分),徐冉(第二部分),袁晏明(第三部分),秦松贤(第四部分),李长安(第五部分)等撰写,英文翻译由袁爱华、王庆完成。

本图册编制过程中得到学校各方面的支持。国家基金委基础科学人才培养基金(J1030518)、国家级实践教学示范中心建设单位(教高函(2007)21 号)、中国地质大学(武汉)设备处、教务处为本图册提供了经费资助。作者在提出本图册设想之初,中国地质大学(武汉)副校长欧阳建平教授给予了充分赞许和鼓励,更坚定了编制本书的信心。殷鸿福院士、欧阳建平副校长为本书作序。金振民、莫宣学院士为周口店实习基地的提词首次在本书中发表。叶俊林、王人镜、吴顺宝、谭应佳、单文琅、郭铁鹰、傅绍仁、曾广策、章泽军、赵温霞、杨坤光、桑隆康、闻立锋、张志、朱彩霞等许多教师为本图册的编制提出了宝贵建议及帮助,中国地质大学出版社刘桂涛以及大魏工作室为本书出版付出了辛勤的工作,在此一并表示衷心地感谢!

赵俊明

2010年6月20日

INTRODUCTION

The Zhoukoudian area, about 45 kilometers southwest to Beijing downtown, has varieties of geological phenomena formed by exogenic and endogenic geological processes in the long history of geological evolution with its unique tectonic attributes. In this relatively small area (about 350 square kilometers), a large number of different kinds of typical geological relics have been found. The unique and abundant geology & geosciences research and teaching resources, coupled with geographical advantages and convenient traffic conditions, provide us with a rare field practice teaching site.

The earliest study of Beijing Western Hill area, including Zhoukoudian, was conducted by the American geologist R. Pumpelly in 1876. The earliest students in our country majored in Geology also conducted field practice here in 1914. Since China University of Geosciences (former Beijing College of Geology) founded field practice teaching base in Zhoukoudian in 1954, the university has achieved remarkable success in teaching, research, and personnel training owing to the hard work of all teachers and students. The Zhoukoudian field practice teaching base has played an important role in educating tens of thousands of specialized people in geology, including hundreds of famous geologists and educators, dozens of academicians of the Chinese Academy of Sciences and top leaders of China in the past over 50 years. The Zhoukoudian field practice teaching base can be regarded as the cradle of geological scientific and technical workers.

In order to develop the educational function of Zhoukoudian geological relics more broadly and to give some sparkle to the “Cradle”, we compile this photo-illustrated book after an overall review of existing achievement by taking and collecting amounts of classic photos of the geological phenomena using imaging techniques which feature visual and clear pictures with strong impact, matching with concise descriptions to reveal features and scientific connotations of geological phenomena. This book will function as image support materials to the teaching of Zhoukoudian field practice, which helps teachers to do field practice teaching more effectively, and students to understand geological knowledge better and thus enhance effects of field practice teaching through indoors review.

The atlas is designed and edited by Zhao Junming and Yuan Yanming. The pictures were photographed and collected by Zhao Junming under the guidance of Zeng Guangce, Zhang Zejun, Yuan Yanming, Qin Songxian, Xu Ran, Li Chang'an and other practice guidance teachers, while the text descriptions were written by Zhao Junming (Introduction, Part I, Part VI), Xu Ran (Part II), Yuan Yanming (Part III), Qin Songxian (Part IV) and Li Chang'an (Part V). English translation was conducted by Yuan Aihua and Wang Qing.

Compiling of the atlas was supported by our university in several ways. It was funded by the National Science Fund for Talent Training in Basic Science (Grant No.J1030518), National Demonstration Center for Practical Teaching (2007, No.21), and Facilities Management Office and Academic Administration of China University of Geosciences (Wuhan). When the writer proposed the idea of the atlas, vice-president of China University of Geosciences (Wuhan), Professor Ouyang Jianping, gave much appreciation and praise, which strengthened our confidence in writing the atlas. We thank Academician Yin Hongfu and vice-president Ouyang Jianping for writing prefaces for the atlas. The inscriptions written by academicians Jin Zhenmin and Mo Xuanxue for Zhoukoudian field practice teaching base are published in this atlas for the first time. Ye Junlin, Wang Renjing, Wu Shunbao, Tan Yingjia, Shan WenLang, Guo Tieying, Fu Shaoren, Zeng Guangce, Zhang Zejun, Zhao Wenxia, Yang Kunguang, Sang Longkang, Wen Lifeng, Zhang Zhi, Zhu Caixia, and many other teachers contributed to the atlas with comments and suggestions are greatly appreciated. We sincerely thank Liu Guitao from China University of Geosciences Press and Dawei Workroom for their hard work in the press of the book.

Zhao Junming
June 20, 2010



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1

实习基地概况

Introduction of the Zhoukoudian Field Practical Teaching Base

中国地质大学周口店实习区,位于北北东向太行山山脉、近东西向燕山山脉和华北平原接壤地带,北至大石河,南至拒马河,东至房山,西至十渡。实习范围内大多为中、低山区,一般为 50 ~ 200 米,地势西北高、东南低,北部最高山峰是上寺岭(猫耳山),海拔 1 307 米;东南部接壤华北平原。区内河流主要有拒马河、大石河、周口店河、黄山店河等。

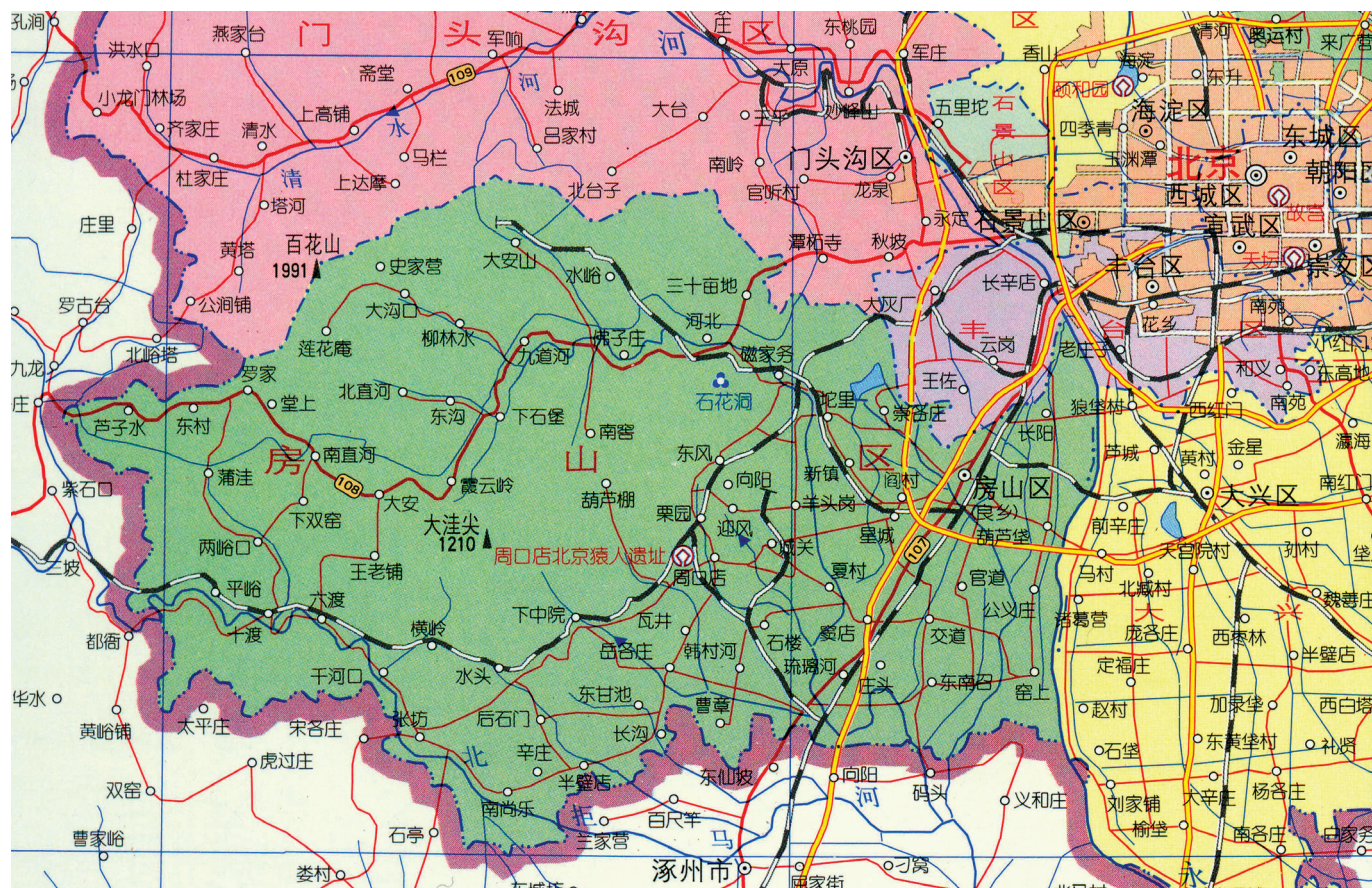
The Zhoukoudian Field Practice Area of China University of Geosciences is located in the border area between NNE trending Taihang Mountain Range, near EW trending Yanshan Mountain Range and the North China Plain, north to Dashi River, south to Juma River, east to Fangshan Mountain and west to Shidu, high in the northwest and low in the southeast, with North China Plain on the southeast. Low and middle mountains from 50~200m occupy most of the practice area. The highest peak is Shangsiling (Maoer Mountain) in the north, at 1 037m. The main rivers are Juma River, Dashi River, Zhoukoudian River, and Huangshandian River.

1.1 周口店野外教学实习基地区域位置

The location of the Field Practical Teaching Base

中国地质大学周口店实践教学基地设在距北京市中心城区西南约 45 千米的房山区周口店镇,地理坐标为北纬 39°41', 东经 115°51', 实习区域铁路、公路交通十分便利。

The Zhoukoudian Field Practical Teaching Base of China University of Geosciences is located in Zhoukoudian Town, Fangshan District, about 45km SW of downtown Beijing, at 39°41'N and 115°51'E. It can be directly reached by bus or train.



周口店实习区交通位置图(据《中国分省地图集》星球地图出版社 2006 年第 3 版)

Location and transportation of the Zhoukoudian Field Practical Teaching Base (Refers To "Atlas of China by Province", Star Map Press, 3rd Edition, 2006)



石

河

大

上寺岭

房山

黄院

周口店

拒

马

孤山口

河

周口店实习区卫星图(来源于 ftp.gicf.umiacs.umd.edu)
Satellite Map of the Zhoukoudian Practice area (from ftp.gicf.umiacs.umd.edu)