

贾承造 主编：塔里木盆地石油地质与勘探丛书

(卷三)

TARIM BASIN

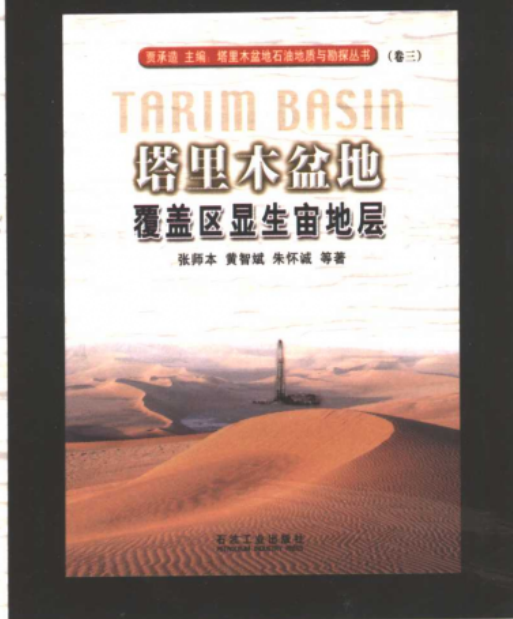
塔里木盆地

覆盖区显生宙地层

张师本 黄智斌 朱怀诚 等著

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TARIM BASIN



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内 容 提 要

本书是《塔里木盆地石油地质与勘探丛书》之卷三,对塔里木盆地覆盖区显生宙地层进行了系统的研究总结。书中建立了10个地层分区或小区的基准剖面 and 岩石地层系统,划分了以各类微体古生物门类为主的160余个化石带或组合,划分了25个地震层序。在此基础上进行了全盆地各纪地层统一划分对比,确定了主要地层界线及展布范围。

本书资料翔实,内容丰富,统一和规范了塔里木盆地显生宙各类地层单位的含义、称谓和地质年代,可广泛应用于塔里木盆地油气勘探科研生产,可供地质和油气勘探科研人员及有关院校师生参考。

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序

以“九五”期间勘探与研究成果为内容的《塔里木盆地石油地质与勘探丛书》一套十二卷即将面世，这是“九五”期间奋战在塔里木盆地这块热土上的全体石油地质工作者集体劳动的结晶，也是石油工业出版社同志们辛勤劳动的产物。它是塔里木盆地油气勘探史上重要的一环。丛书的出版，必将引起国内外石油界的广泛瞩目和浓厚的兴趣，我对丛书的出版表示热烈祝贺。

塔里木盆地的油气勘探从 20 世纪 50 年代算起已经有 50 多年了，其间因为种种原因，经历了“几上几下”的曲折历程，也积累了丰富的资料和经验教训。1989 年 4 月经国务院批准由中国石油天然气总公司组织了塔里木盆地石油会战，从而为在塔里木盆地大规模全面展开油气勘探迈出了扎实的历史性的步伐。与此同时国家也组织了相应的以塔里木盆地油气勘探为内容的“八五”和“九五”的重点攻关项目。

《塔里木盆地石油地质与勘探丛书》的内容，正是在广大石油工作者近 40 年野外和盆地周边地质调查和钻探、石油地球物理勘探局挺进大漠后连续苦干近 20 年所取得的丰硕资料，在“七五”和“八五”国家重点攻关研究工作的基础上，通过 5 年或更长时间的实践和研究所取得的成果，在此期间，对重点地区和重点层系进行了艰苦有效的研究和实践，应该说取得了令人满意的勘探成果，开创和深化了新的理论和认识，特别在复杂断裂构造带和碳酸盐岩中进行油气勘探，积累和丰富了大量储层描述和评价、地震采集和处理、测井、完井、试油等一系列理论、技术和工作方法。

“九五”期间，共发现或探明了 13 个大、中型油气田，27 个工业性含油气构造。发现和探明了大型整装的克拉 2 大气田，探明天然气地质储量 $2840 \times 10^8 \text{m}^3$ ，发现了库车坳陷的富天然气聚集带，为“西气东输”奠定了资源基础；继续探明了塔河一轮南大油田。近 5 年来新增油气地质储量 $5.905 \times 10^8 \text{t}$ （当量），其中石油地质储量 $1.908 \times 10^8 \text{t}$ ，天然气地质储量为 $3997 \times 10^8 \text{m}^3$ ，2000 年生产原油 $440 \times 10^4 \text{t}$ 。

通过“九五”期间勘探和研究，对库车前陆盆地石油地质的认识取得了重大进展，初步形成了库车大气区的石油地质理论基础；在古生代海相碳酸盐岩油气成藏规律研究、克拉通主力烃源岩评价、海相碳酸盐岩和碎屑岩储层发育机制及成藏期与成藏模式研究等方面，取得了新进展，丰富了海相石油地质理论，深化了对古老克拉通盆地海相油气分布规律的认识；对塔里木盆地石油地质的深入研究，明确了塔里木中、新生代盆地大地构造背景及包括塔里木盆地在内的特提斯北缘盆地群的油气地质特征；进一步总结和完善了塔里木盆地油气的富集成藏规律，评价优选出了一大批有利勘探区带和目标，明确了塔里木盆地油气勘探的战略发展方向，并形成了一系列油气勘探的技术和方法。

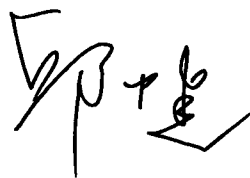
特别是库车前陆盆地创造性地运用断层相关褶皱理论，在库车前陆盆地褶皱—逆冲构造带建立了 10 种构造模型，并用于地震剖面精细构造解释和制图；应用煤成烃理论，深入分析和系统评价了库车前陆盆地三叠—侏罗系煤系地层烃源岩。提出库车前陆盆地发育分布广、厚度大、有机质丰度高、有机质类型以腐殖型为主、成熟度高的煤系地层烃源岩等，初步认识了库车大气区的石油地质特征。

针对山地地震勘探、高陡构造钻井、超高压气藏测试和评价、碳酸盐岩孔、洞、缝型储层的识别和预测及超深、低幅度薄层砂岩油藏勘探等一系列难题，加大了勘探技术攻关的力度，初步形成了五套油气勘探评价技术系列，基本满足了当前塔里木盆地油气勘探的需要。

这套丛书系统总结了“九五”及前人对塔里木盆地的勘探和研究工作，特点是总结了5年的勘探实践和认识。其中既有勘探的认识和基础研究成果，也有油气富集规律的总结和新技术、新方法的应用，内容十分丰富，对今后塔里木盆地乃至其它相似盆地的油气勘探有一定的借鉴意义。但我们认为，这些成果并不都是十分成熟、十全十美的，正相反，毕竟塔里木盆地情况十分复杂，勘探程度还比较低，许多难题还尚未解决，勘探的道路还很漫长，我们的认识虽有大的进步，但还有很多不清楚和不明白的环节和规律。可贵的是，塔里木盆地的石油地质工作者勇于实践，勇于探索，锲而不舍，不断进取，及时总结经验和教训，敢于把这些成果亮出来，接受实践的检验，在实践中深化认识。我相信，这套丛书的出版，定会丰富中国石油地质学的理论与实践，并对今后的勘探工作起到重要的指导作用。

随着塔里木盆地油气勘探不断深入并取得更大进展，人们的认识将会更加接近客观实际和事物的本来面目，通过继续不断地努力和探索，定会实现油气勘探的飞跃。到那时，中国石油工业的希望——塔里木盆地，将出现更多的克拉2和塔河一轮南型的大型油气田，进入新的油气储量增长的高峰期，塔里木盆地真正成为中国石油工业战略接替基地，我对此充满信心。

最后，我衷心希望丛书的出版能够起到“抛砖引玉”的作用，能够在一定程度上满足全国石油地质界关心和支持塔里木盆地找油事业的专家同仁的需要，并引起更多人的兴趣，从而参加到塔里木盆地油气勘探的接力赛的行列中来，共同投身到富有诱惑、充满挑战而又奥秘神奇的塔里木盆地这块热土中来。

A handwritten signature in black ink, consisting of stylized Chinese characters, likely '俞建' (Yu Jian).

2003年6月

Preface

The 12-volume collection of *Petroleum Geology and Exploration of Tarim Basin*, the content of which is the exploration and research achievements during the "Ninth Five-Year Plan" period, will be published. This collection is the crystallization of all petroleum geologists ever fought in hot land of Tarim Basin during the "Ninth Five-Year Plan" period and the product of arduous work of comrades of Petroleum Industry Press. It is one important page of the hydrocarbon exploration history of Tarim Basin. After being published, this collection will undoubtedly be widely cared by domestic and foreign petroleum circles and bring them great interest. I hereby express my congratulation to the publishing of this collection.

Hydrocarbon exploration work in Tarim Basin started in 1950s and till now it has an over-50-year's history. In this course, the exploration personnel had suffered with many frustrations for various reasons but they also obtained rich materials, experiences and lessons. China National Petroleum Corporation, after approved by the State Council, organized a mass petroleum exploration campaign in April 1989, which was a firm and historic step for the large-scale overall hydrocarbon exploration in Tarim Basin. Meanwhile, the state also organized some "Eighth Five-year Plan" and "Ninth Five-Year Plan" brainstorm projects focusing on hydrocarbon exploration of Tarim Basin.

The content of the collection of *Petroleum Geology and Exploration of Tarim Basin* is full of the plentiful and substantial materials that have been obtained by a lot of petroleum workers through field geologic survey and drilling work around the basin in nearly 40 years and through continuous hard work for nearly 20 years after the Bureau of Geophysical Prospecting. This collection also contains the achievements that have been obtained through the practice and research for five years or more time based on the national key brainstorm research work during the "Seventh Five-year Plan" and "Eighth Five-year Plan" period; during this period, geologists had conducted hard but effective studies and practice on key regions and key series of strata. This course does obtain satisfying exploration achievements and initiate and deepen new theories and understandings. Especially, the hydrocarbon exploration work in complicated fracture zones and carbonate helps geologists in accumulating and enriching a series of theories, technologies and work methods such as large reservoir description and evaluation, seismic acquisition and processing, well logging, well completion and oil test and so forth.

During the "Ninth Five-Year Plan" period, 13 large/middle oilfields / gasfields and 27 gas-/oil-bearing structures available for industrial application in total have been discovered or proven. The large self-contained Kela-2 Large Gasfield was discovered and proven during this period, the proven geological reserves of natural gases of which are $2,840 \times 10^8 \text{m}^3$, while the rich natural gas accumulation zone was discovered in Kuche Depression, which establishing the resource foundation for the "West-East Pipeline Project". Later, Tahe-Lunnan Large Oilfield was ascertained. In recent five years, $5.905 \times 10^8 \text{t}$ (equivalent weight) of geological reserves of oil and gas have been

ascertained, including $1.908 \times 10^8 \text{t}$ of geological reserves of petroleum, $3,997 \times 10^8 \text{m}^3$ of geological reserves of natural gas. In 2000, the production of crude oil reached $440 \times 10^4 \text{t}$.

Through the exploration and research during the "Ninth Five-Year Plan" period, the understanding to petroleum geology of Kuche Foreland Basin has had an important breakthrough, and the theoretical foundation for petroleum geology has been preliminarily established for the large natural gas area in Kuche. In such aspects of research on Paleozoic marine carbonate hydrocarbon reservoir formation law, evaluation on major hydrocarbon source rock in Craton, research on development mechanism of marine carbonate and clastic reservoir, reservoir formation period and reservoir formation model and so on, some new progresses have been obtained, which has enriched the theory relating to marine petroleum geology, deepened the understanding on marine hydrocarbon distribution law of ancient cratonic basin. The deep research on petroleum geology of Tarim Basin ascertains the tectonic background of the Cenozoic basin of Tarim and the geological characteristics of hydrocarbon in basin groups in north edge of Tethys including Tarim Basin; it further concludes and perfects the occurrence and reservoir formation laws of hydrocarbons in Tarim Basin, evaluates and optimizes a large batch of favorable exploration areas, zones and destinations, determines the strategic development direction for hydrocarbon exploration of Tarim Basin and obtains a series of hydrocarbon exploration technologies and methods.

Especially, in Kuche foreland basin, geologists have innovatively applied the fault-related folding theory to establish 10 structure models in the fold-thrust structure zones of Kuche foreland basin and used it for interpretation and plotting of fine structures of seismic profile; the theory that states how coal is turned into hydrocarbon has been used to deeply analyze and systematically evaluate the hydrocarbon source rocks in the Triassic-Jurassic coal measure strata in Kuche foreland basin. It proposes the opinion that the coal measure strata hydrocarbon source rocks of wide distribution range, large thickness, high organic matter abundance, humus as main organic matter and high maturity are developing in Kuche foreland basin, while preliminarily understanding the petroleum geological characteristics of Kuche large gas area.

The brainstorm strength of exploration technologies is increased for a series of difficulties such as mountainous seismic exploration, drilling of high and steep structure, testing and evaluation on super-high pressure gas reservoir, recognition and prediction of carbonate hole, pore and seam-shaped reservoir, exploration of super-deep, low-amplitude thin sandstone oil reservoir, preliminarily establishing five sets of hydrocarbon exploration and evaluation technologies, which basically meet the current hydrocarbon exploration need of Tarim Basin.

This collection systematically concludes the exploration and research work that was carried during the "Ninth Five-Year Plan" period and by predecessors. Especially, it concludes the exploration practice and understandings obtained in past five years, including the understandings to existing exploration and basic research achievements and also including the conclusions of hydrocarbon occurrence law and application of new technologies and methods. Its contents are very rich and have a certain guiding significance to the future hydrocarbon exploration in Tarim Basin and other similar basin. However, we do not think that these achievements are very mature and perfect. On the

contrary, as the situations of Tarim Basin are very complicated, its exploration degree is relatively low, there are many difficulties unsolved and the exploration road is still very long, in our understandings there still are many unclear links and laws although there is a large progress. It is notable that the petroleum geologists in Tarim Basin are brave in practice and probing into new fields, they can work with perseverance for greater progress, and they are always summarizing experiences and taking lessons from practice, and they are brave to inspect their achievements in practice so as to deepen their understandings in practice. I believe that this collection will undoubtedly enrich the theories and practice of China's petroleum geology and play an important guidance role to the future exploration work.

As the hydrocarbon exploration in Tarim Basin has been continuously deepened and more progress has been obtained, our understandings will be closer to the reality and the original appearance of things. Through continuous efforts and exploration, our hydrocarbon exploration will undoubtedly have a forward leap. Till then, the hope of China's petroleum industry--Tarim Basin will produce more large oilfields and gasfields like Kela-2# and Tahe-Lunnan and get into a new peak stage of hydrocarbon reservoir, and Tarim Basin will really become the strategic base of China's petroleum industry. I am confident in this.

Finally, I sincerely hope that the publishing of this collection can play the role that offers a few commonplace remarks by way of introduction so that others may come up with valuable opinions, can in a certain degree meet the need of those experts in the national petroleum geology field who concerns with and support the petroleum exploration work in Tarim Basin, and can intrigue more people, so that there are more people to throw themselves into the hydrocarbon exploration relay race of Tarim Basin and to step into the charming and mystic Tarim Basin full of challenges.

Qiu Zhongjian

June 2003

前 言

塔里木盆地是我国最大的中、新生代内陆盆地，又是一个叠加于古生代地台之上的含油气复合盆地。它夹持在天山、昆仑山和阿尔金山之间，经历了长期的地质发展历史，展现出错综复杂的地层特征：地层发育全，层系多，厚度大；地层类型繁多，不同类型的地层发育了不同的岩性、岩相和生物群；同类地层的展布因复杂的构造变形和断裂位移而屡遭破坏。地层研究是石油地质研究和油气勘探开发生产的基础，塔里木盆地具有 20 余套含油气层系，震旦系及显生代的 12 个系均与生油或储油有关，不断提高塔里木盆地地层研究程度，对油气勘探开发具有重要意义。

塔里木盆地的地层研究虽然经过广大地质、地层工作者 80 余年的艰苦努力，特别是经过“七五”、“八五”两个五年计划的国家科技攻关，取得了重大进展，但研究重点主要在盆地周边露头区，对盆地内部广大覆盖区研究较少，还不能满足盆地油气勘探迅猛发展的需要。为此，“九五”国家重点科技攻关项目“塔里木盆地石油天然气勘探”确定的地层研究重点为盆地覆盖区，先后设立了“塔里木盆地覆盖区基准剖面建立及对比（96-111-01-07~09）”和“塔里木盆地重点地区重点层系地层划分对比（99-111-02-01）”等专题开展攻关研究。在 2000 年 5 月召开的第三届全国地层会议上通过的《2000—2015 年全国地层工作和地层学发展规划纲要》中，把加强西部能源和矿产基地的地层研究工作作为首要任务，并且把塔里木盆地等重要能源区的地层层序建立及对比列在首位。为此，塔里木油田分公司又适时设立了“塔里木盆地覆盖区显生宙地层统层”研究项目。本书是在该项目及“九五”国家重点科技攻关项目“塔里木盆地石油天然气勘探”下属各项地层研究专题攻关成果综合和提高的基础上编写而成。

本书确定的编写思路是：以《国际地层指南》和《中国地层指南》确定的多重地层单元划分的理论和原则为指导，以生物地层学研究为基础，从地层区划、清理岩石地层单位、准确确定其时代和重新标定、规范地震反射层地质含义为起点，综合分析，进行综合的统一划分对比，分区建立基准剖面及地层系统。

本书经过全体研究人员近六年的艰苦努力，圆满完成了全部的研究和编写工作，并取得以下主要成果：

（1）采用地层区、地层分区、地层小区三级划分法，以构造单元的控制作用为主要因素，以第一届全国地层会议“关于中国地层区划的建议”为依据。将塔里木盆地及其周边地层划分为 1 个地层区、11 个地层分区、29 个地层小区。

（2）根据《国际地层指南》和《中国地层指南》规定的原则，从“创名及原始定义”、“沿革”、“现在定义”、“层型”、“地质特征及区域变化”、“其他”等方面对塔里木盆地及周边地区以往建立的和使用过的岩石地层单位进行了清理，共清理岩石地层单位 126 个，建议使用的岩石地层单位 88 个，建议停止使用的岩石地层单位 38 个。

（3）全面系统地收集整理了历年覆盖区主要探井的古生物化石资料，完善了寒武—奥陶系，志留—泥盆系，石炭—二叠系，中、新生界有关门类化石组合（带）。为塔里木盆地覆盖区各层系的时代确定奠定了基础。

(4) 建立了塔里木盆地震旦系及显生宙地震地层系统, 划分了 25 个地震层序。

(5) 首次系统地建立了覆盖区库车地层分区, 塔北地层分区英买力地层小区、轮台地层小区、轮南地层小区, 阿瓦提—满加尔地层分区阿瓦提地层小区、满加尔地层小区, 塔克拉玛干地层分区巴楚地层小区、塔中地层小区、塘古孜巴斯地层小区、塔东地层小区, 塔西南地层分区麦盖提地层小区等 1 个地层分区、10 个地层小区的地层基准剖面 and 5 个地层分区的地层系统。为建立全区地层系统和进行大区域对比打下了基础。

(6) 论述了塔里木盆地显生宙各纪地层的展布、对比及界线的划分。

本书总结的成果可以为塔里木油气区新一轮地层统层工作提供技术支持, 在统一和规范从生产到科研, 从井位设计、实钻结果到各类科研报告和生产报表所使用的各类地层单位的含义、称谓和时代, 消除以往不同单位、不同作者和不同成果对有关地层单位使用的混乱和误导等方面发挥作用, 有利于地质勘探工作的正常交流和研究工作的深入, 促进塔里木油气勘探新的大发展。

本书的出版还将丰富新疆乃至全国、全球地层古生物资料, 对推进新疆、全国油气区和全国的地层研究也具有重要意义。

塔里木油田分公司勘探开发研究院张师本、黄智斌、李猛、杜品德、谭泽金、赵治信、高琴琴、王智和杨芝林等参加了“九五”国家重点科技攻关项目“塔里木盆地石油天然气勘探”下属地层专题及“塔里木盆地覆盖区显生宙地层统层”项目的全部研究及本书的编写工作; 中国科学院南京地质古生物研究所朱怀诚、耿良玉、卢辉楠、黎文本、王启飞、彭金兰、王兰, 中国科学院古脊椎动物与古人类研究所王念忠、王俊卿, 塔里木油田分公司勘探开发研究院刘静江、张敬洲、余新启、刘万祥和新疆油田分公司勘探开发研究院塔里木油田现场古生物实验室詹家桢和唐鹏参加了“九五”国家重点科技攻关项目“塔里木盆地石油天然气勘探”下属有关地层专题的研究并参与了本书的编写。

本书的研究成果是上述全体研究人员辛勤劳动的结晶, 书稿最后由张师本、黄智斌负责统编。由于研究工作量较大, 书中一定会存在不少问题和不足, 敬请读者指正。

塔里木盆地地层项目研究以及本书的编写是在中国石油天然气股份有限公司贾承造总地质师的直接关怀和指导下进行的; 塔里木油田分公司勘探开发研究院王招明院长、王清华副院长以及勘探所和科研办的有关领导也给予了许多具体的指导和帮助, 在此一并致以深切谢意。

作 者

2003 年 6 月

Foreword

Tarim Basin is the largest Mesozoic and Cenozoic inland basin in China, which is also an oil and gas composite basin stacked above Paleozoic platform, located among Tianshan Mountains, Kunlun Mountains and Altun Mountains. Tarim Basin experiences a long-term geological development history and is possessed with complicated stratigraphic characteristics: full stratigraphic development with multiple stratum series and large thickness and variety of stratigraphic types. Different lithologic properties, lithofacies and biological groups developed in the strata of the different types. Development and distribution of the strata of the same types are subject to the repeated destruction owing to the complicated structural variation and fault displacement. The stratigraphic study is the foundation for petroleum geological study and oil and gas exploration and development. Tarim Basin has more than 20 sets of oil and gas strata series. Of those, Sinian and 12 Systems of Phanerozoic Eonothem are related with oil source and reservoir. Continuous reinforcement of stratigraphic study in Tarim Basin is of important significance to oil and gas exploration and development.

Great progress has been made in the stratigraphic study thanks to the hardworking efforts of many geologists in the past eight decades, the state research projects in China's "Seventh Five-Year Plan" and "Eighth Five-Year Plan" in particular. However, the study is focused on the outcrop area surrounding the basin. The study is inadequate for the extensive areal coverage within the basin, unable to meet the demand of rapid development for oil and gas exploration in the basin. Therefore, "Oil and Natural Gas Exploration in Tarim Basin", a key scientific research project in China's Ninth Five-Year Plan, defines the areal coverage of the basin as the focus of the study, launching two special topics for the scientific research -- "Establishment and Comparison of Base Profiles of Areal Coverage in Tarim Basin (96-111-01-07~09)" and "Division and Comparison of Key Strata in Key Levels and Regions in Tarim Basin (99-111-02-01)". The platform of the 2000-2015 national stratigraphic work and research development plan, approved at the third session of National Stratigraphic Conference held in May 2000, gives priority to the stratigraphic study for strengthening the energy and minerals bases in the western part of China. It also gives top priority to establishment and comparison of the stratigraphic sequences in the important energy regions like Tarim Basin. As a result, PetroChina Tarim Oil Field Company has timely launched the research project of "Phanerozoic Eonothem stratum series in areal coverage of Tarim Basin". This book is formulated on the basis of the results achieved from the stratigraphic research projects of various special topics under the key research project in the state "Ninth Five-Year Plan"--"Oil and Natural Gas Exploration in Tarim Basin".

Formulation of this book follows the theories and principles for division of multiple

stratigraphic units defined in *International Stratigraphic Guide* and *China's Stratigraphic Guide*. It is also based on biostratigraphic study and focused on zonal division of strata, clarification of lithostratigraphic unit, accurate identification of times, and standardization of the seismic reflection geological definition. Based on the comprehensive analysis, the book makes unified division and comparison and establishes zonal base profiles and stratum systems.

With the tenacious efforts by all the research workers for nearly six years, this book is smoothly completed for formulation and research with the following main results:

(1) Adopting the three-stage division method of stratigraphic region, stratigraphic sub-region and stratigraphic minor-region, regarding the controlling effect of structural unit as the main factor and based on "Suggestion on China's Stratigraphic Classification" of the first session of National Stratigraphic Conference. Tarim Basin and its surrounding strata are divided into one stratigraphic region, 11 stratigraphic sub-regions and 29 stratigraphic minor-regions.

(2) Based on the principles stipulated in *International Stratigraphic Guide* and *China's Stratigraphic Guide*, clarification is made on the lithostratigraphic units established in the past for Tarim Basin and its surrounding region in terms of "Original definition", "current definition", "stratotype", "geological characteristics and regional variation" and "others". A total of 126 lithostratigraphic units are brought under clarification, of which 88 ones are suggested for use while 38 others are suggested for abandonment.

(2) The book comprehensively and systematically collects the paleontologic data of main exploration wells in the areal coverage and perfects the related fossil assemblage (zone) of Cambrian-Ordovician, Silurian-Devonian, Carboniferous-Permian, Mesozoic and Cenozoic, laying foundation for identifying the times of various stratum series in the covered area of Tarim Basin.

(3) Establishing the Sinian and Phanerozoic Eonothem seismic stratigraphic systems in Tarim Basin and dividing 25 seismic sequences.

(4) Establishing for the first time the stratigraphic base profiles of one stratigraphic sub-region and 10 stratigraphic minor-regions in the covered area, such as Kuqa stratigraphic sub-region, Yengimahalla stratigraphic minor-region, Luntai stratigraphic minor-region and Lunnan stratigraphic minor-region in Tabei stratigraphic sub-region, Awat stratigraphic minor-region and Manjiaer stratigraphic minor-region in Awat-Manjiaer stratigraphic sub-region, Bachu stratigraphic minor-region, Tazhong stratigraphic minor-region, Tangguzibasi stratigraphic minor-region and Tadong stratigraphic minor-region in Taklimakan stratigraphic sub-region, and Markit stratigraphic minor-region in Taxinan stratigraphic sub-region, as well as establishing the stratum systems of five stratigraphic sub-regions. This lays foundation for establishment of the whole regional stratum system and comparison of large regions.

(5) Elaborating extension and distribution, correlation and boundary division of Phanerozoic Eonothem formations in Tarim Basin.

The results summed up in this book can provide technological support for the new round of stratum statistical work of the oil and gas area in Tarim Basin. It helps unify and standardize the definitions and names and times of various stratigraphic units used for production, scientific research, well position design, scientific research reports and production statements, and eliminate the disorder and misunderstanding in using the stratigraphic units by different companies, different authors and different results. It will benefit the communications and research for geological exploration work and promote oil and gas exploration and development in Tarim Basin.

Publication of this book enriches the paleontologic data of strata in Xinjiang and even the whole nation and the world and is of important significance to the study of the nationwide oil and gas areas and strata.

Zhang Shibei, Huang Zhibing, Li Meng, Du Pinde, Tan Zejin, Zhao Zhixin, Gao Qinqin, Wang Zhi and Yang Zhilin, from Exploration and Development Research Institute of Tarim Oil Field Company participate in the special topics of stratum study under the key scientific research project of the country's "Ninth Five-Year Plan"--"Oil and Natural Gas Exploration in Tarim Basin" and the research project of "Phanerozoic Eonothem in covered area of Tarim Basin". They also participate in formulation of this book. Zhu Huaicheng, Geng Liangyu, Lu Huinan, Li Wenben, Wang Qifei, Peng Jinlan and Wang Lan from Nanjing Institute of Geology and Paleontology, Chinese Academy of Sciences, Wang Nianzhong and Wang Junqin from Institute of Vertebrate Paleozoology and Paleoanthropology, Chinese Academy of Sciences, Liu Jingjiang, Zhang Jingzhou, Yu Xinqi and Liu Wanxiang from Exploration and Development Research Institute of Tarim Oil Field Company, and Zhan Jiazhen and Tang Peng from Tarim Oil Field Paleontological Laboratory of Exploration and Development Research Institute of Xinjiang Oil Field Company also participate in the special topics of formation study under the key scientific research project of the country's "Ninth Five-Year Plan"--"Oil and Natural Gas Exploration in Tarim Basin" -- and the research project of "Phanerozoic Eonothem in Areal Coverage of Tarim Basin".

The research results of this book are the teamwork of all above-mentioned research personnel. Zhang Shibei and Huang Zhibing make final examination of the whole book. Shortcomings may exist in this book owing to a large amount of research work. Corrections are welcome.

The stratigraphic study project of Tarim Basin and the formulation of this book are directly under guidance of Chief Geologist of PetroChina Jia Chengzao. Director and deputy director of Exploration and Development Research Institute of Tarim Oil Field Company Wang Zhaoming and Wang Qinghua as well as the leaders of Exploration Department and Scientific Research Office also give a lot of help in formulation of this book. Gratitude is extended to all of them.

Author
June 2003

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