

中国

寒武纪和奥陶纪 岩相古地理

冯增昭 彭勇民 金振奎 鲍志东 著



中国寒武纪和奥陶纪 岩相古地理

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石油工业出版社

内 容 提 要

本书是作者承担的原中国石油天然气总公司科研正式项目“中国寒武纪和奥陶纪岩相古地理研究及编图”的最终成果。作者以沉积学理论为指导,以第一手的定量资料为立脚点,以单因素分析多因素综合作图法为方法论,成功地编制出了华北地区、华南地区、西北地区以及全国范围的寒武纪和奥陶纪岩相古地理图,撰写成本书,开拓和发展了定量岩相古地理学,并有效地为石油及其他矿产资源的预测和勘探服务。

本书可作为国内外地质工作者及相关院校师生的参考书。

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Feng Zengzhao Peng Yongmin Jin Zhenkui Bao Zhidong

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序

一、完成了任务

《中国寒武纪和奥陶纪岩相古地理》是笔者承担的原中国石油天然气总公司（现为中国石油天然气集团公司）科研正式项目“中国寒武纪和奥陶纪岩相古地理研究及编图”（94 科字第 69 号）的最终成果。

自 1994 年笔者开始承担原中国石油天然气总公司的科研正式项目“中国寒武纪和奥陶纪岩相古地理研究及编图”任务以来，至今已 9 年。自 1977 年笔者开始我国的寒武纪和奥陶纪岩相古地理研究及编图以来，至今已 26 年。在此 26 年和 9 年中，笔者等先后多次承担和完成了国家自然科学基金委员会、原中国石油天然气总公司和各生产单位的科研项目，出版了华北地区、鄂尔多斯地区、华南地区和西北地区寒武纪和奥陶纪岩相古地理专著 5 部^[1~5]，还发表了论文 20 多篇。这些是本书的基础。

在这些研究成果的基础上，主要是在 5 部专著的基础上，结合其他地区的地质资料，主要采用笔者探索出来的新的岩相古地理学方法论——“单因素分析多因素综合作图法”（以前称“单因素分析综合作图法”），全面分析，综合判断，编制出了全国范围的寒武纪和奥陶纪岩相古地理图 8 幅，并撰写出相应的文字论述，从而完成了原中国石油天然气总公司下达的科研任务，完成了本书的编图和撰写任务。

我们是遵循以下四条指导原则完成任务的。

第一，以沉积学的理论为指导。因此，本书中的古地理图是沉积古地理图即岩相古地理图，本书属岩相古地理学的范畴，以此有别于生物古地理学、构造古地理学、地史古地理学等范畴的著作。

第二，以第一手的定量资料为立脚点。本书中的岩相古地理图主要是根据我们自己研究的野外露头剖面 and 钻井剖面所取得的各种第一手的定量资料为基础，并结合前人的资料编制出来的。在本书中，共使用野外露头剖面 792 条，钻井剖面 129 条，地震剖面 16 137 km。其中一级露头剖面 200 条，二级露头剖面 251 条，三级露头剖面 341 条，一级钻井剖面 74 条，二级钻井剖面 41 条，三级钻井剖面 14 条。一级剖面都是我们自己研究的，各种定量资料可信。二级剖面都是我们认真核对过的，其定量资料（主要是厚度）基本可信。三级剖面的资料只能作为参考资料。有了这些剖面尤其是一级剖面的各种定量资料为基础，我们的岩相古地理图就是定量的或定量为主的岩相古地理图，本书就属定量岩相古地理学的范畴。定量，即每个古地理单元的划分和确定都有确切的定量资料和定量单因素图为依据。这是我们的立脚点，有所开拓和有所创见的立脚点。这是本书最主要的特点。

第三，以单因素分析多因素综合作图法为方法论。这是我们成功地编制定量岩相古地理图的关键。

第四，为石油、天然气以及其他矿产资源的预测和勘探服务。

由于我们所依据的原始资料主要是定量的，所采用的方法论是定量的，编制出的岩相古地理图是定量的或定量为主的，因此，本书以及笔者等以前出版的许多著作^[1~12]和论文就都是定量岩相古地理学的著作。这样，就使岩相古地理学逐步地发展到了定量岩相古地理学阶段。这在古地理学中是个重大的开拓性的发展。

与此同时，还培养出了大量的人才。仅在 1994 年原中国石油天然气总公司批准建立本科研项目以来的 9 年中，就培养出硕士 2 人（张传录和韩宇春）、博士 7 人（田海芹、汪红、王国力、谭健、康祺发、张永生和韩征）、博士后 4 人（张永生、张家强、彭勇民和王玉新）。他们均对本项研究任务和本书作出了贡献。如果从 1977 年我开始从事寒武纪和奥陶纪定量岩相古地理研究及编图以来，培养出的学士、硕士、博士、博士后就更多了，如对本项研究和本书作出过贡献的吴胜和、陈继新、金振奎、鲍志东、田波、陈永红、王宜林、左文岐、尤孝忠、雷明、王增莲等。他们现在大都是教授或教授级高工，有的还担负着重要的领导职务。这是人才成果。从长远观点看，这种人才成果比科研成果更为重要。作为一个教师，对此我感到欣慰。

二、验收与鉴定

在本项目的最终研究成果《中国寒武纪和奥陶纪岩相古地理》即本书的原稿完成后，中国石油天然气集团公司科技发展部邀请石宝珩、王鸿祯、韩德馨、张鹏飞、刘本培、沙庆安、蒋其凯、傅诚德、薛叔浩、孙为群、周家尧等 11 位专家组成验收委员会，石宝珩为主任，对本研究项目的最终研究成果进行评审和验收。验收委员会认为：本研究成果出色地完成了原中国石油天然气总公司规定的科研任务，是一份优秀的研究成果，总体上达到国际先进水平。

随后，教育部又邀请韩德馨、叶连俊、张鹏飞、沙庆安、乔秀夫、杨承运、王德发、顾家裕等 8 位专家组成科学技术成果鉴定委员会，韩德馨为主任，对本项目的最终研究成果进行鉴定。鉴定委员会认为：本研究成果原始资料丰富，结论可信；所采用的单因素分析综合作图法是原创性的和行之有效的；所编制的定量的多级别的和多类型的岩相古地理图是原创性的，使岩相古地理学发展到了定量化阶段；8 幅彩色的全国范围的岩相古地理图精美；对华南地区和鄂尔多斯地区的油气勘探的认识有独到的见解，有一定的指导作用。本研究成果已很好地完成了原中国石油天然气总公司下达的研究任务，是一份优秀的研究成果，总体达到国际先进水平，其中单因素分析综合作图方面达到国际领先水平。

感谢验收委员会和鉴定委员会对本研究成果的肯定和评价。

在验收委员会和鉴定委员会对本研究成果验收和鉴定之后，根据专家们的指教和建议，我们又对本研究成果作了多次的补充和修正。现在，本书的终稿已定，即将由石油工业出版社出版。

在此，我再次感谢石油大学、原中国石油天然气总公司科技局（现中国石油天然气集团公司科技发展部）、教育部的领导对本项研究长期的支持和关心！感谢所有参加过本项研究的同学们、校内外的战友们的风雨同舟和患难与共的战斗情谊！感谢各生产单位、各院校、各研究单位以及其他有关单位的领导、专家和同志们的大力支持！

还要感谢中国石油天然气集团公司科技发展部资助本书的全部出版费用，感谢石油工业出版社的周家尧副总编辑和马新福责任编辑对本书出版工作的大力支持和对本书的精心

编辑加工,感谢中国地质科学院的谢良珍高级工程师以正规的地学制图学规范对本书的8幅全国范围的1:1800万的岩相古地理图的精心设计及清绘。这就保证了本书出版的优质水平。

三、古 地 理 图

在古地理学研究中,古地理图是第一位的。古地理图是古地理学研究成果的集中表现,是古地理学的生长点。古地理学各分支学科领域或学派就主要是根据它们的古地理图的特征或类型而区分的。

有许多类型的古地理图,如生物古地理图、构造古地理图、地史古地理图、岩相古地理图、定量的古地理图、非定量的古地理图、当今界限的古地理图、非当今界限的古地理图、不同地质时期的古地理图、不同地区的古地理图、不同比例尺的古地理图等,还有固定论的古地理图和活动论的古地理图。

笔者不赞赏固定论的古地理图和活动论的古地理图这两个术语,更不赞赏有些专家对它们的褒贬。因此笔者提出了两个新的术语,即当今界限的古地理图和非当今界限的古地理图^[13,14]。

当今界限的古地理图主要是以当今的经纬度为坐标,以当今的国界、省界、某些特定的区域界限、构造界限为古地理图的边界或古地理单元界限的古地理图。非当今界限的古地理图主要是以古地磁资料确定出的某板块或某地质体的古纬度为坐标而勾绘出的古地理图。仅用古纬度资料而无古经度资料是不可能确定某板块或某地质体的确切位置的。如果说仅用古纬度资料勾绘出来的古地理图是“活动论”的古地理图,那也太活动了。大多数的古地理图都是当今界限的古地理图。某些构造古地理图或地史古地理图是非当今界限的古地理图。非当今界限的古地理图都是非定量的,大都是全球性的,其比例尺大都很小甚至是示意性的。当今界限的古地理图和非当今界限的古地理图是两种性质大不相同的古地理图,各有千秋,各有其特点和用处,并无先进和后进之分。

本书中的古地理图是全国范围的和地区性的、寒武纪的和奥陶纪的、当今界限的、定量的或定量为主的岩相古地理图。全国范围的岩相古地理图的比例尺为1:1800万,地区性的岩相古地理图的原图的比例尺为1:250万~1:100万。这种古地理图对油气的预测和勘探最有用处。这是本书的特点。

本书亦有缺点,即像有些专家所指出的,还没有用古地磁资料把一些大台地,如华北台地、扬子台地、塔里木台地等的非当今界限的古纬度位置图勾绘出来作为本书中的当今界限的古地理图的补充。这个缺点只有待以后补充了。

四、第三里程献李桃

《中国寒武纪和奥陶纪岩相古地理》是笔者等的第一部全国范围的定量岩相古地理学专著。笔者等以前出版的定量岩相古地理学专著^[1~12]都是地区性的,都不是全国性的。刘鸿允(1955)的《中国古地图》^[15]、关士聪等(1984)的《中国海陆变迁海域沉积相与油气》^[16]和王鸿祯等(1985)的《中国古地图集》^[17]等专著都是全国范围的古地理学专著,其涉及的地质时代是从震旦纪到三叠纪甚至是从长城纪到第四纪。但这些著作中的古地理图都不是定量的。在古地理研究及编图的地质时代的数量上,本书远远没有赶上这

些著作,对此我十分惭愧。但在定量古地理研究和编图及其更有效地为油气及其他矿产资源的预测和勘探服务上,本书是有所开拓、创见和前进的,对此我还算有点欣慰。

刘鸿允先生的《中国古地理图》是我国第一部古地理学专著,是我国古地理学研究及编图的正式起点。它主要是以古生物学资料为依据编制出的古地理图集,可算是我国生物古地理学领域的专著和代表作。王鸿祯先生等的《中国古地理图集》主要是以大地构造学的理论为指导的古地理学专著,可算是我国构造古地理学领域的代表作。20年前,我正在从事华北地区寒武纪和奥陶纪定量岩相古地理研究和编图,我就下决心再花10年功夫,和我的战友们及学生们一起,完成一部以沉积学理论为指导的各主要地质时期的定量岩相古地理学图集,算是我国定量岩相古地理学领域的专著。此乃我长期为之奋斗的“第三领域献李桃”或“第三里程献李桃”^[18]也。

光阴似箭,转眼就是20年,我方才完成两个地质时期即寒武纪和奥陶纪的全国范围的定量岩相古地理研究及编图,距我的奋斗目标还有相当大的距离。愧哉!难哉!

20年的艰苦奋斗过程使我逐步地明白:编制全国范围的各主要地质时期的定量岩相古地理图是一个十分艰巨的任务,是我国地学领域的一个重大的基本建设任务,必须以自己研究的野外露头剖面 and 钻井剖面中所取得的各种第一手的定量资料为基础或立脚点,再辅之以前人的资料,才能完成任务。仅靠或主要靠前人的资料(大都是定性的资料)是不可能编制出定量岩相古地理图的。仅靠少数人的小规模的努力是很难完成任务的。必须有政府的主管部门的大力支持、统筹规划和全面开展工作的。难就难在这里。

2002年12月,我和刘本培教授及刘纪远研究员共同主持了香山科学会议第197次学术讨论会“多信息的古地理重建”^[19],全体与会专家对我国古地理学的发展前景达成了共识,即:根据多学科的、多层圈的、第一手为主的和定量为主的资料,编制从长城纪到第四纪以及人类历史时期的、各种比例尺兼有的、既有地学理论意义又能为生产实践和人类生存环境的维护和改善服务的、综合各古地理学分支学科之长的古地理图,是时候了。这是一个巨大的工程。让我们共同努力,为促使这一有重大历史意义和现实意义的宏伟目标的早日实现而奋斗^[20]!显然,这个共识的目标比我原来的目标更为宏伟,它把人类历史时期和所有的古地理学分支学科领域都包括进去了。

但是,要把这个宏伟的目标变成现实,还有许多工作要做。

现在还没有使有关部门的领导了解编制全国范围的各主要地质时期的、甚至包括人类历史时期的、多学科的、多层圈的、定量为主的古地理图首先是各主要地质时期的定量岩相古地理图的重大意义。

现谨以本书——笔者等近26年来的劳动成果,作为“全国定量岩相古地理研究及编图”项目或“全国多学科多信息古地理重建”项目的申请书,呈献给有关部门。希有关部门领导能研究和支持这一地学领域中的重大基础研究项目。

如果这一申请能获得支持,就可团结全国各有关部门的志同道合者,以年轻的专家们为主力,群策群力,在大约5~6年或7~8年的时间内,编制出全国范围的各主要地质时期的定量岩相古地理图,或编制出包括人类历史时期的、多学科的、各种比例尺兼有的、定量为主的古地理图,并以此为基础撰写出相应的专著,进一步开拓和发展我国的古地理学并使之多方面地处于国际领先水平,更有效地为石油、天然气以及其他矿产资源的预测和勘探以及人类生存的地理环境的改善服务。到那时,就可以向我们伟大的祖国奉献古地

理学的大李大桃了。

谨此为序。敬希领导、专家以及广大读者指教和支持。

冯增昭

2003年11月

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Preface

I Task Completed

The book, *Lithofacies Paleogeography of the Cambrian and Ordovician in China*, is the final research achievement of the present writer's research subject "Study and Mapping of Lithofacies Paleogeography of the Cambrian and Ordovician in China", which is sponsored by the China National Petroleum Corporation (CNPC).

It has been 9 years since the research subject "Study and Mapping of Lithofacies Paleogeography of the Cambrian and Ordovician in China" was started in 1994. It has been 26 years since the present writer began to study and map the lithofacies paleogeography of the Cambrian and Ordovician in China in 1977. During the past 9 years and 26 years, the present writer undertook and completed several research subjects sponsored by the National Natural Science Fund, CNPC and some oil companies, published 5 monographs on lithofacies paleogeography of the Cambrian and Ordovician of North China, Ordos, South China and Northwest China^[1~5], and published over 20 papers. All these are the foundation of this book.

On the basis of these research achievements, mainly the five monographs, and geological data of other areas, with "Single Factor Analysis and Multifactor Comprehensive Mapping Method" (previously called "Single Factor Analysis and Comprehensive Mapping Method") — new methodology of lithofacies paleogeography probed out by the present writer, through comprehensive analysis and judgment, 8 all-China lithofacies paleogeography maps of the Cambrian and Ordovician are completed, and corresponding explanations are written. Thus the research task assigned by CNPC is finished, and the task of mapping and writing of this book is finished.

We finished the task according to following four principles.

First, the theory of sedimentology is the guide. Therefore the paleogeography maps in this book are sedimentological paleogeography maps, *i. e.* lithofacies paleogeography maps. This book belongs to the category of lithofacies paleogeography, and is thus different from books on paleontological paleogeography, tectonopaleogeography or geohistorical paleogeography.

Second, first-hand quantitative data is the foothold. The lithofacies paleogeography maps in this book are compiled on the basis of various first-hand data obtained through our study of outcrop sections and borehole sections as well as predecessors' data. In this book, 792 outcrop sections, 129 borehole sections and 16 137km seismic profiles are used.

Among the sections, first class outcrop sections are 200, second class outcrop sections are 251 and third class outcrop sections are 341; first class borehole sections are 74, second class borehole sections are 41 and third class borehole sections are 14. First class sections refer to sections studied by ourselves, and various quantitative data are reliable. Second class sections refer to sections carefully examined by us, and the quantitative data (mainly thickness) are basically trustable. Data of third class sections can only be used as reference. With the various quantitative data of these sections and especially first class sections as the basis, our lithofacies paleogeography maps are quantitative or mainly quantitative lithofacies paleogeography maps. And this book belongs to the category of quantitative lithofacies paleogeography. Quantification refers to that the delineation and definition of every paleogeographic unit is based on quantitative data and quantitative single factor maps. This is our foothold, a foothold to pioneer and to innovate. This is one of the most important characteristics of this book.

Third, the Single Factor Analysis and Multifactor Comprehensive Mapping Method^[1~12] is the methodology. This is the key for us to successfully compile lithofacies paleogeography maps.

Fourth, the purpose is to serve forecast and exploration of oil and gas as well as other mineral resources.

As the original data that we used to compile paleogeography maps is quantitative and the methodology that we adopted is quantitative, the lithofacies paleogeography maps that we compiled are quantitative, and this book and previous books^[1~12] and papers by the present writer are all quantitative lithofacies paleogeography works. This makes lithofacies paleogeography gradually develop to the stage of quantitative lithofacies paleogeography. This is an important pioneering development in paleogeography.

At the same time, a number of talents have been trained. Two masters (Zhang Chuanlu and Han Yuchun), 7 doctors (Tian Haiqin, Wang Hong, Wang Guoli, Tan Jian, Kang Qifa, Zhang Yongsheng and Han Zheng) and 4 post-doctors (Zhang Yongsheng, Zhang Jiaqiang, Peng Yongmin and Wang Yuxin) graduated in the past 9 years since the research subject was approved by CNPC. Much more bachelors, masters, doctors and post-doctors are trained in the past 26 years since I began to pursue the study and mapping of lithofacies paleogeography of the Cambrian and Ordovician, such as Wu Shenghe, Chen Jixin, Jin Zhenkui, Bao Zhidong, Tian Bo, Chen Yonghong, Wang Yilin, Zuo Wenqi, You Xiaozhong, Leiming and Wang Zenglian, who made contribution to this research and this book. Now they are professors or senior engineers, and some of them are in important leader posts. These are talent achievements. From the viewpoint of future, talent achievements are more important than research achievements. As a teacher, I feel gratified at this.

II Acceptance and Appraisal

After the research was finally finished and the manuscript of this book was comple-

ted, the Science and Technology Development Bureau of CNPC invited Shi Baoheng, Wang Hongzhen, Han Dexin, Zhang Pengfei, Liu Benpei, Sha Qing'an, Jiang Qikai, Fu Chengde, Xue Shuhao, Sun Weiqun and Zhou Jiayao, totally 11 experts to compose an Acceptance Committee with Shi Baoheng as the chairman and checked the final achievements of this research subject. The Acceptance committee believes that the research group distinctively completed the research task assigned by CNPC, and the research achievements are excellent and on the whole reach the international advanced level.

Then, the Ministry of Education again invited Han Dexin, Ye Lianjun, Zhang Pengfei, Sha Qing'an, Qiao Xiufu, Yang Chengyun, Wang Defa and Gu Jiayu, totally 8 experts to compose a Science and Technology Appraisal Committee with Han Dexin as the chairman and appraised the final achievements of this research subject. The Appraisal Committee believes that the research is based on abundant original data and the conclusions are reliable, the adopted Single Factor Analysis and Multifactor Comprehensive Mapping Method is original and effective, the compiled quantitative Multirank and multitype lithofacies paleogeography maps are original and makes lithofacies paleogeography develop to the quantitative stage, the 8 colorful all-China lithofacies paleogeography maps are exquisite, the viewpoint about oil and gas exploration in South China and Ordos region is original and directive, the researchers excellently completed the research task assigned by CNPC, the research achievements are excellent and on the whole reach the international advanced level, and the mapping with Single Factor Analysis and Multifactor Comprehensive Mapping Method reaches international leading level.

We thank the Acceptance Committee and Appraisal Committee for their high evaluation and praise on the research achievements.

After acceptance and appraisal of the research achievements by the Acceptance Committee and Appraisal Committee, we made many times supplement and correction to the research achievements according to the suggestions by the experts. Now the final manuscript of this book is completed and will be published by the Petroleum Industry Press.

Here, I would again extend my thanks to the leaders of the University of Petroleum, Science and Technology Development Bureau of CNPC and Ministry of Education for their long support and concern, to all students, colleagues and friends who took part in this research, to leaders and friends of different production units, institutes, universities, and to the Petroleum Industry Press.

III Paleogeography Maps

In the study of paleogeography, the paleogeography maps are primary. Paleogeography maps are the concentrated expression of research achievements of paleogeography, and are the growth point of paleogeography. Different branches or schools of paleogeography are distinguished according to their characteristics or types of paleogeography maps.

There are many types of paleogeography maps, such as paleontological paleogeogra-

phy maps, tectonopaleogeography maps, geohistorical paleogeography maps, lithofacies paleogeography maps, quantitative lithofacies paleogeography maps, non-quantitative lithofacies paleogeography maps, paleogeography maps with present boundaries, paleogeography maps with non-present boundaries, paleogeography maps of different geological ages, paleogeography maps of different areas, paleogeography maps of different scales, as well as paleogeography maps of fixed theory and mobile theory.

The present writer does not approve of the two terms paleogeography maps of fixed theory and paleogeography maps of mobile theory, and does not agree with the praise or criticism by some experts. The present writer proposes two new terms: paleogeography maps with present boundaries and paleogeography maps with non-present boundaries^[13,14].

Paleogeography maps with present boundaries refer to paleogeography maps which take present longitudes and latitudes as coordinates and take present boundaries of states, provinces, specific regions and tectonic lines as the boundaries of paleogeography maps or as the boundaries of some paleogeographic units. Paleogeography maps with non-present boundaries refer to paleogeography maps which take the paleolatitude of some plates or terranes determined through paleomagnetic data as the coordinates. But it is impossible to determine the accurate position of some plates or terranes only on the basis of paleolatitude data without paleolongitude data. If the paleogeography maps drawn only on the basis of paleolatitude data can be called paleogeography maps of mobile theory, then they are too "mobile". Most paleogeography maps are with present boundaries. Some tectonopaleogeography maps or some geological history paleogeography maps are with non-present boundaries. Paleogeography maps with non-present boundaries are non-quantitative and most are global. Their scales are commonly very small or even sketchy. Paleogeography maps with present boundaries and paleogeography maps with non-present boundaries are greatly different in nature. Each has its own advantages and applications, no discrimination between advanced and backward.

Paleogeography maps in this book are all-China and regional, are on Cambrian and Ordovician, are with present boundaries, and are quantitative or mainly quantitative. The scale of all-China lithofacies paleogeography maps is 1 : 18 000 000, and that of regional lithofacies paleogeography maps is 1 : 2 500 000 to 1 : 1 000 000. This type of lithofacies paleogeography maps is the most useful in forecast and exploration of oil and gas. These are characteristics of this book.

There also exist shortcomings in this book. That is, as pointed out by some experts, the paleolatitude positions of some large platforms (plates) are not determined with paleomagnetic data as a supplement. This shortcoming could only be supplemented in the future.

IV Present Plums and Peaches at the Third Milestone

This book *Lithofacies Paleogeography of the Cambrian and Ordovician in China* is

the first monograph on all-China quantitative lithofacies paleogeography by the present writers. The previous monographs^[1~12] on quantitative lithofacies paleogeography by the present writers are all regional and not all-China. The *Atlas of Paleogeography of China*^[15] by Liu Hongyun (1955), *The Changes of Land and Sea, Marine Sedimentary Facies and Hydrocarbons in China*^[16] by Guan Shicong *et al.* (1984), and *Atlas of the Paleogeography of China*^[17] by Wang Hongzhen *et al.* (1985) are all monographs on all-China paleogeography, and the geological ages referred range from the Sinian to Triassic or even from the Changcheng Period to Quaternary. However, the paleogeography maps in those books are not quantitative. In the number of geological ages of study and mapping of lithofacies paleogeography, our book is less than those books. But in quantification of study and mapping of lithofacies paleogeography, and in application to forecast and exploration of oil and gas, our book is pioneering and advanced.

The *Atlas of Paleogeography of China* by Liu Hongyun is the first monograph on paleogeography of China, and is the formal start of study and mapping of paleogeography. It is mainly based on paleontological data and can be considered as the representative monograph in the field of paleontological paleogeography of our country. The *Atlas of the Paleogeography of China* by Wang Hongzhen *et al.* is directed with the theory of tectonics, and can be considered as the representative monograph in the field of tectonopaleogeography of our country. Twenty years ago, when I was pursuing the study and mapping of quantitative lithofacies paleogeography of the Cambrian and Ordovician of North China, I was determined, together with my comrades and students, to take 10 years to complete an atlas of quantitative lithofacies paleogeography with the theory of sedimentology as the guide, which can be considered as the representative monograph in the field of lithofacies paleogeography of our country. This is "Present Plums and Peaches at the Third Milestone"^[18], for which I have strived for a long time.

Time lapses quickly. In a wink, 20 years past. But I have only completed study and mapping of quantitative lithofacies paleogeography of the Cambrian and Ordovician of China, which is far from my objective.

The striving process of the 20 years gradually makes me understand that it is a very arduous task to compile quantitative lithofacies paleogeography maps of major geological ages in China. This is an important basic task in the field of paleogeography of China. To finish this task, we must take the first-hand data obtained through our own study of outcrop sections and borehole sections as the foothold, and be assisted with predecessors' data. It is impossible to compile quantitative lithofacies paleogeography maps only on the basis of predecessors' data (mostly qualitative). It is also very difficult to finish this task only through the efforts of a few people. It must be supported, planned and organized by relevant government departments. This is where the difficulty lies.

Last December, together with Professor Liu Benpei and Professor Liu Jiyuan, I presided over the 197th Xiangshan Science Conference on Multiinformation Reconstruction of

Paleogeography^[19]. All the experts attending the conference came to the common understanding that it is time to compile paleogeography maps which are based on multidiscipline, multisphere(of the Earth), multiage, firsthand and quantitative data, cover the Changcheng Period to the Quaternary and human historical age with various scales, serve production practice and maintenance and improvement of human living environments, and synthesize the advantages of different branches of paleogeography. This is a huge project. Let's make efforts together and strive for early realization of the great object of both important historical significance and practical significance^[20]. Obviously, the object of common understanding is greater than mine before. It includes the humankind historical ages and all branches of paleogeography.

However, to realize this great object, we need to do much work.

Now I have not made the authorities understand the significance of compiling multidiscipline, multisphere and quantitative paleogeography maps of major geological ages and humankind historical ages of all-China.

Now I present this book as the application to the project "Quantitative Lithofacies Paleogeography Study and Mapping of China" or "Multidiscipline and Multiinformation Reconstruction of Paleogeography of China", to the leading units. I hope the authorities can consider and approve this project.

If the application is approved, we can unite comrades from different units of all China, with young experts as the main force, and take about 5~6 or 7~8 years to compile the quantitative lithofacies paleogeography maps of major geological ages of China, or compile paleogeography maps which cover major geological ages and humankind historical ages of China, with multidiscipline data and mainly quantitative data. Based on these maps, we can write out corresponding monographs, further pioneer and develop paleogeography of our motherland, make it reach the leading level in the world and serve more effectively the forecast and exploration of oil and gas and other mineral resources as well as improvement of human living environments. At that time, we can present big plums and big peaches of paleogeography to our great country!

Feng Zengzhao

November 2003

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