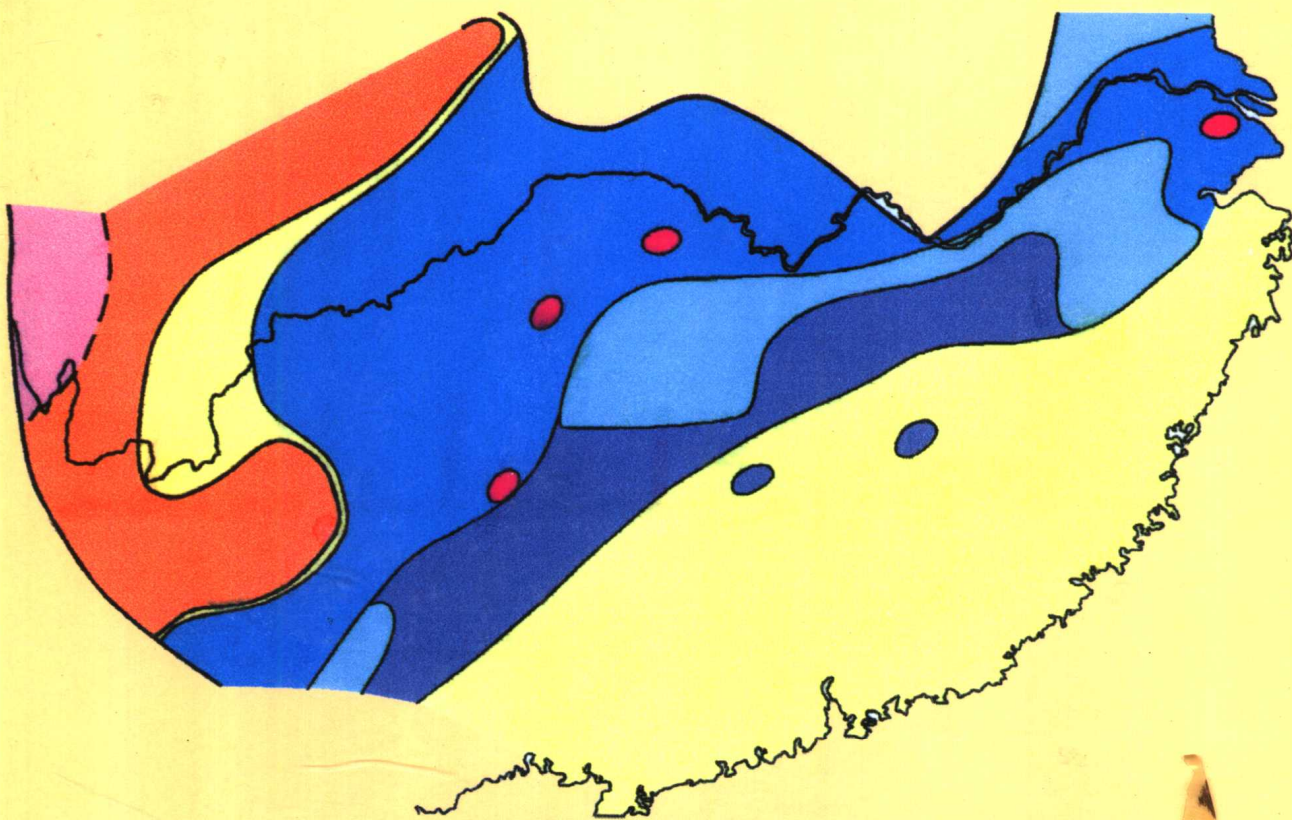




# 中国南方寒武纪和奥陶纪 岩相古地理

冯增昭 彭勇民 金振奎 蒋盘良 鲍志东 著  
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# 序

本书是在笔者承担的中国石油天然气总公司（现中国石油天然气集团公司）科研项目“中国寒武纪及奥陶纪岩相古地理研究及编图”（94 科字第 69 号）中的部分研究任务“中国南方寒武纪及奥陶纪岩相古地理研究及编图”的研究成果的基础上精炼而成的。

本书是笔者等的第 12 本岩相古地理学专著<sup>[1-11]</sup>。这些专著都是科研成果的结晶，都是源书<sup>[10]</sup>。源书者，原始创作也。它们是岩相古地理学赖以发展的根源。

本书最主要的特点和创新是定量，即每个古地理单元的划分和确定都有确切的定量数据和单因素图为依据。这在南方寒武纪和奥陶纪古地理学研究中还是首次。这就使岩相古地理图和岩相古地理学发展到了定量阶段。这在古地理学中是个重大的进展。

本书把中国南方寒武纪和奥陶纪古地理体系的基本格局及其演化规律基本上搞清楚了。中国南方寒武纪和奥陶纪有 7 个主要的古地理单元，即两陆（康滇陆和华夏陆）、三台（滇西台地、扬子台地和东南台地）、一盆（江南盆地）和一坡（江南盆地与扬子台地之间的斜坡）。滇西台地、康滇陆、扬子台地、江南盆地以及江南盆地与扬子台地之间的斜坡属康滇古地理体系，东南台地和华夏陆属华夏古地理体系。这两个古地理体系拼合在一起，就构成了南方寒武纪和奥陶纪岩相古地理的两陆、三台、一盆和一坡的基本格局。把这个基本格局及其演化规律基本上搞清楚了，其他的一些问题就可以迎刃而解或可以逐步解决了。这算是本项研究和本书对南方寒武纪和奥陶纪古地理研究及编图工作的一点贡献。

从“中国南方寒武纪及奥陶纪岩相古地理研究及编图”这一科研任务的开始到完成，再到本书的定稿，历时 6 年有余。先后参加工作的主要人员有博士生田海芹和汪红、高级工程师罗璋和鞠天吟、博士后彭勇民、以及金振奎教授、蒋盘良高级工程师、鲍志东教授等。工作量是大的，工作过程是曲折的和艰难的。

在这个工作过程中，田海芹和汪红完成了他们的博士生学习任务并获得了博士学位，彭勇民也完成了他的博士后研究任务。这是人才成果。从长远观点看，这个人才成果比本项研究任务的完成和本书的出版还要重要。

本书是笔者等的第 5 本寒武纪和奥陶纪岩相古地理学专著<sup>[2,3,9,11]</sup>。本书的出版是完成全国范围的寒武纪和奥陶纪岩相古地理研究及编图任务的重要一步。到现在为止，中国三大地区即华北地区、西北地区和南方地区的寒武纪和奥陶纪岩相古地理研究及编图任务已经完成。下一步就是在这三大地区研究成果的基础上，把青藏地区及其他地区的有关寒武纪和奥陶纪的资料收集起来，编制全国范围的寒武纪和奥陶纪岩相古地理图和撰写相应的文字论述了。

看来，完成“中国寒武纪及奥陶纪岩相古地理研究及编图”任务将为期不远了。但是，行百里者半九十，仔细算来，还有许多困难需要一个一个地克服。笔者等正在作最后冲锋的准备，争取早日高质量高水平地完成这一任务，开始实现我的“第三里程献李

桃”<sup>[12]</sup>的夙愿。

在“中国南方寒武纪及奥陶纪岩相古地理研究及编图”任务完成和《中国南方寒武纪和奥陶纪岩相古地理》专著即将出版问世之际，要感谢中国石油天然气总公司（现中国石油天然气集团公司）和石油大学有关领导的大力支持，感谢贵州省地矿局区调院的董卫平总工程师和焦惠亮高级工程师，贵州零五工程处的杨宏高级工程师，滇黔桂石油勘探局的李尚武高级工程师，云南地质科学研究所的蒋志文高级工程师、罗惠麟高级工程师和张玉山高级工程师，南京大学的黄志诚教授，华东地质学院的李浩昌教授，浙江石油勘探处的叶舟高级工程师，西安地质学院的叶俭教授，江汉石油学院的高振中教授、郭成贤教授和李建明副教授，四川石油管理局地质研究院的李天生高级工程师和张荫本高级工程师，西南石油学院的强子同教授和王兴志博士，中国地质大学的刘本培教授和杨式溥教授等的大力支持。

但是，本书仍有不少缺点或不足之处，主要是缺少从岩相古地理论述和预测石油、天然气和其他矿产，缺少从生物化石组合论述沉积和古地理环境，对岩石学的研究尚欠深入，对东南地区的研究更是不够，等等。本来，从岩相古地理论述石油、天然气和其他矿产以及从生物化石组合论述沉积和古地理环境这两部分都已写出来了，而且也已校对了若干次。但反复掂量，还是感到水平欠高，故只好“割爱”。

敬请广大读者指教。

冯增昭

2000年11月

于石油大学，北京

### 参 考 文 献

- [1] 冯增昭，王英华，李尚武等，1988，下扬子地区中下三叠统青龙群岩相古地理研究，云南科技出版社。
- [2] 冯增昭等，1990，华北地台早古生代岩相古地理，地质出版社。
- [3] 冯增昭，陈继新，张吉森，1991，鄂尔多斯地区早古生代岩相古地理，地质出版社。
- [4] 冯增昭等，1991，中下扬子地区二叠纪岩相古地理，地质出版社。
- [5] 冯增昭，金振奎，杨玉卿，鲍志东，辛文杰等，1994，滇黔桂地区二叠纪岩相古地理，地质出版社。
- [6] 冯增昭，鲍志东，李尚武等，1994，滇黔桂地区早中三叠世岩相古地理，石油大学出版社。
- [7] 冯增昭，杨玉卿，金振奎，李尚武，鲍志东等，1997，中国南方二叠纪岩相古地理，石油大学出版社。
- [8] 冯增昭，鲍志东，李尚武等，1997，中国南方早中三叠世岩相古地理，石油工业出版社。
- [9] 冯增昭，鲍志东，张永生，谭健等，1998，鄂尔多斯地区奥陶纪地层岩石岩相古地理，地质出版社。
- [10] 冯增昭，杨玉卿，鲍志东，金振奎等，1998，中国南方石炭纪岩相古地理，地质出版社。
- [11] 冯增昭，张家强，王国力，金振奎，鲍志东，2000，中国西北地区寒武纪和奥陶纪岩相古地理，石油大学出版社。
- [12] 见 [1]、[2]、[7]、[8]、[10]。

# Preface

This book, *Lithofacies Paleogeography of the Cambrian and Ordovician in South China*, is the refinement of the research achievements of “the Study and Mapping of Lithofacies Paleogeography of the Cambrian and Ordovician in South China”, which is a part of the scientific research project “the Study and Mapping of Lithofacies Paleogeography of the Cambrian and Ordovician in China” undertaken by me. This project is from China National Petroleum Corporation (CNPC).

This book is my twelfth monograph on lithofacies paleogeography<sup>[1~11]</sup>. All these monographs are scientific research works, and all are source books. Source books are original creation. They are the foundation upon which the development of lithofacies paleogeography depends.

The major characteristic of this book is quantification. That is, definition of each paleogeographical unit is based on accurate quantitative data and single factor maps. It is the first time in the study and mapping of lithofacies paleogeography of the Cambrian and Ordovician in South China. This makes lithofacies paleogeography maps and lithofacies paleogeography develop to the quantitative stage. This is an important development in paleogeography.

The main achievements reflected in this book are that the fundamental framework and evolutionary law of the paleogeography system of the Cambrian and Ordovician in South China are found out. There are 7 principal paleogeography units in the Cambrian and Ordovician in South China, i.e. 2 lands (Kangdian Land and Cathaysian Land), 3 platforms (Dianxi Platform, Yangtze Platform and Southeast Platform), 1 basin (Jiangnan Basin) and 1 slope (the slope between the Jiangnan Basin and Yangtze Platform). Dianxi Platform, Kangdian Land, Yangtze Platform, Jiangnan Basin and the slope between the Jiangnan Basin and Yangtze Platform belong to Kangdian paleogeography system. Southeast Platform and Cathaysian Land belong to Cathaysian paleogeography system. These two paleogeography systems together form the fundamental framework of the lithofacies paleogeography of the Cambrian and Ordovician in South China, i.e. 2 lands, 3 platforms, 1 basin and 1 slope. Once the fundamental framework and the evolutionary law are found out, the other problems will be resolved or gradually resolved. This may be the contribution of this research and this book to the study and mapping of lithofacies paleogeography of the Cambrian and Ordovician in South China.

It lasts for over six years from the beginning to the end of the scientific research “the Study and Mapping of Lithofacies Paleogeography of the Cambrian and Ordovician in South China”, and to the publication of this book, *Lithofacies Paleogeography of the Cambrian and Ordovician in South China*. The chief participants include doctor students Tian Haiqin and Wang Hong, senior engineers Luo Zhang and Ju Tianyin, postdoctor Peng Yongmin, and Professor Jin Zhenkui, senior engineer Jiang Panliang and Professor Bao Zhidong. The workload is heavy and the research process is tortuous and difficult.



During this research process, Tian Haiqin and Wang Hong finished their doctoral studies and obtained Ph. D degree, and Peng Yongmin finished his postdoctoral research. These are talent fruits. In the long run, these talent fruits are much more important than the accomplishment of the research work and the publication of the book.

This book is my fifth monograph on lithofacies paleogeography of the Cambrian and Ordovician<sup>[2,3,9,11]</sup>. The publication of this book is an important step toward completing the study and mapping of lithofacies paleogeography of the Cambrian and Ordovician of the whole China. Up to now, the study and mapping of lithofacies paleogeography of the Cambrian and Ordovician in North China, Northwest China and South China has been finished. Next, based on the research achievements of these three large regions, through collecting data of Qinghai-Tibet region and other regions about the Cambrian and Ordovician, the lithofacies paleogeography maps of the Cambrian and Ordovician in the whole China will be compiled, and correspondent text explanations will be written.

It does not seem to be long to complete the task of “the Study and Mapping of lithofacies paleogeography of the Cambrian and Ordovician in China”. But, “ninety miles is only half distance to the one hundred-mile end point” and there are still many difficulties need to be overcome one by one. The author is preparing for the final charge, and trying to finish this task with high level and high quality as early as possible, so as to realize my long cherished wish to “present the pears and peaches at the third milestone”<sup>[12]</sup>.

At the time of the completion of the task “the Study and Mapping of Lithofacies Paleogeography of the Cambrian and Ordovician in China” and the publication of the monograph the *Study and Mapping of Lithofacies Paleogeography of the Cambrian and Ordovician in South China*, we sincerely thank the leaders of CNPC and the University of Petroleum for their great support, and thank the chief engineer Dong Weiping and senior engineer Jiao Huiliang of Regional Survey Institute of Bureau of Geology and mineral resources of Guizhou Province, senior engineer Yanghong of the 05 Engineering Bureau of Guizhou Province, senior engineer Li Shangwu of the Petroleum Exploration Bureau of Yunnan – Guizhou – Guangxi Province, senior engineers Jiang Zhiwen, Luo Huilin and Zhang Yushan of the Geoscience Institute of Yunnan Province, Professor Huang Zhicheng of Nanjing University, Professor Li Haochang of Geoscience Institute of East China, senior engineer Ye Zhou of Petroleum Exploration Bureau of Zhejiang Province, Professor Ye Jian of Xian College of Geology, Professor Gao Zhenzhong, Guo Chenxian and associate Professor Li Jianming of Jiangnan Petroleum Institute, senior engineer Li Tiansheng and Zhang Yinben of Geological Institute of the Sichuan Petroleum Bureau, Professor Qiang Zhitong and Doctor Wang Xingzhi of Southwest Petroleum Institute, and Professor Liu Benpei and Yang Shipu of China University of Geosciences, for their great support.

But, there are still many defects in this book, such as lacking the discussion and prediction of oil, gas and other mineral resources based on the lithofacies paleogeography, lacking the discussion of sedimentary and paleogeographical environments based on the fossil assemblages, and there is still much to do about petrology, especially in southeast area. In fact, the discussion and prediction of oil, gas and other mineral resources based on the lithofacies paleogeography and the discussion of sedimentary and paleogeographical environments based on the fossil assemblages have been completed and

have been proof read many times. But after consideration, I think they still need to be revised, so I have to delete them with regret.

I sincerely hope the reading public of this book can give suggestions for further improvement.

**Feng Zengzhao**

November 2000

University of Petroleum, Beijing

## References

- [1] Feng Zengzhao, Wang Yinghua, Li Shangwu et al., 1988, Study on Lithofacies paleogeography of Qinglong Group of Lower – Middle Triassic in the Lower Yangtze River Region, Yunnan Science and Technology Press.
- [2] Feng Zengzhao et al., 1990, Lithofacies paleogeography of Early Paleozoic of North China Platform, Geological Publishing House.
- [3] Feng Zengzhao, Chen Jixin and Zhang Jisheng, 1991, Lithofacies paleogeography of Early Paleozoic of Ordos, Geological Publishing House.
- [4] Feng Zengzhao et al., 1991, Lithofacies paleogeography of Permian of Middle and Lower Yangtze Region, Geological Publishing House.
- [5] Feng Zengzhao, Jin Zhenkui, Yang Yuqing, Bao Zhidong Xin Wenjie et al., 1994 Lithofacies paleogeography of Permian of Yunnan -Guizhou-Guangxi Region, Geological Publishing House.
- [6] Feng Zengzhao, Bao Zhidong, Li Shangwu et al., 1994, Lithofacies paleogeography of Early and Middle Triassic of Yunnan – Guizhou – Guangxi region, Petroleum University Press.
- [7] Feng Zengzhao, Yang Yuqing, Jin Zhenkui, Li Shangwu, Bao Zhidong et al., 1997, Lithofacies paleogeography of Permian of South China, Petroleum University Press.
- [8] Feng Zengzhao, Bao Zhidong, Li Shangwu et al., 1997, Lithofacies paleogeography of Early and Middle Triassic of South China, Petroleum Industry Press.
- [9] Feng Zengzhao, Bao Zhidong, Zhang Yongsheng, Tan Jian et al., 1998, Stratigraphy Petrology and Lithofacies paleogeography of Ordovician in Ordos, Geological Publishing House.
- [10] Feng Zengzhao, Yang Yuqing, Bao Zhidong, Jin Zhenkui et al., 1998, Lithofacies paleogeography of Carboniferous in South China, Geological Publishing House.
- [11] Feng Zengzhao, Zhang Jiaqiang, Wang Guoli, Jin Zhenkui, Bao Zhidong, 2000, Lithofacies paleogeography of Cambrian and Ordovician in Northwest China, Petroleum University Press.
- [12] See the preface of [1], [2], [7], [8] and [10].



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