

The background of the cover is a vibrant red. Overlaid on this are intricate white line drawings. At the top, there are stylized, swirling clouds. Below them, a landscape is depicted with several oil derricks of varying heights. In the foreground, there are more clouds, some of which appear to be billowing from the base of the derricks. At the bottom, there are more clouds and what looks like a small body of water or a road. The overall style is reminiscent of traditional Chinese ink wash painting but with a modern industrial theme.

翁文波学术论文选集

石油工业出版社

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内 容 提 要

本文集收集了翁文波教授 50 多年来有代表性的学术论文 50 篇，包括地球科学、石油科学和预测科学三部分内容。地球科学部分，从地球的物理、化学性质及其与天体的相互关系，阐述了地球形态的发展；石油科学部分，详细论述了世界和我国油气田分布规律，作出了中国最早的系统含油气远景区划图，并对非海相生油、盆地评价以及我国地球物理学和石油地质学的发展进行了探讨；预测科学部分，作者开拓性地将可公度性和浮动频率法扩展到预测领域，获得了很高的成功率，这是预测科学理论和实践上的重大突破。

本文集不仅是翁教授学术成就总结性的记载，而且对以后从事石油和预测科学研究的学者也有极高的学习和参考价值。

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翁文波教授 (1991 年)

(侯艺兵摄)

翁文波教授 1912 年 2 月 18 日出生于浙江省鄞县 (宁波市)。1934 年以《天然地震预报》论文毕业于清华大学物理系。遂就职于北平研究院物理研究所。1936 年考入英国伦敦大学帝国学院深造, 专攻应用地球物理。1939 年获博士学位, 当即归国任中央大学物理系教授。1941 年, 奔赴正在创建的玉门油矿工作。次年在简陋的条件下与冯平 (鸿平) 女士结成伉俪。在 1942~1943 年间还参加了以黄汲清为队长的新疆油田地质调查队的工作。

抗日战争胜利后, 翁教授任中国石油公司勘探室主任。1951 年, 调任燃料工业部石油管理总局勘探处副处长, 主持筹建了我国第一个地震队。随后, 在石油工业部先后任勘探司总工程师、研究院副院长及总工程师等职。并曾任中国地震学会名誉理事和当选为全国第三届人大代表, 第五、六、七届全国政协委员。现为中国科学院学部委员、中国地球物理学会理事长。

1991年4月，翁文波在全国天灾预报研讨会上作报告



翁文波在工作 (1991年春)



翁文波与我国老一辈地质学家在一起 (前排左起：程裕淇、杨遵仪、翁文波、黄汲清，后排为翁文波家属)





翁文波与石油勘探开发研究院参加翁文波先生八十寿辰庆祝会的同志在一起



1992年春节在康世恩家（左起：王涛、康世恩、翁文波）



翁文波同著名科学家严济慈先生在一起



翁文波(老学部委员)与他的两位学生
——童宪章、李德生(新学部委员)



翁文波在第一次地球物理国际会议上
(左起：翁文波、格林、王淦昌、顾功叙、傅承义)



新疆油田地质调查主要成员合影
(1942年12月，于独山子油田，右起：
卞美年、杨钟健、翁文波、黄汲清、程裕淇)



1942年于玉门油矿
(左起：翁文波、童宪章、张锡龄、陈贲)



1945年10月，我国第一个重磁力队在甘肃高台县南华村成立并在河西走廊开展野外测量（前排中间：翁文波，左五：冯平，左四：汤任先，左三：李德生，右五：丛范滋）

1946年10月，重磁力勘探队在台湾北部中坜县合影（前排右二：翁文波，右三：冯平，右四：汤任先，右五：李德生，前蹲者：孟尔盛，后排右：丛范滋，左：王敬耀）



《翁文波学术论文选集》编委会

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序

翁文波教授是当代著名的地球物理学家和石油地质学家，是知名的预测论专家。1934年，他在清华大学毕业时的学士论文即是《天然地震预报》，从此与地球科学结下了不解之缘。1936年，在伦敦大学帝国学院攻读应用地球物理时，他曾大胆探索、自行设计、亲自动手改制了一台“重力探矿仪”，1939年获博士学位后回国。时值抗日战火纷飞，他历经艰难险阻回到祖国，随身携带物品大都遗散流失，唯有重力仪经精心维护，得以安全无损。40年代初，他用这台仪器在河西走廊、天山南北开创我国最早期的重力石油勘探工作。尔后，又制作了磁力仪、测井仪；筹建并领导了我国第一个重力队和第一个地震队，是我国地球物理石油勘探事业的先驱。

翁文波教授在40年代末、50年代初，撰写了《从煤炭定碳比看中国石油远景》、《世界油田的分布规律》、《中国油气资源》等论著，1953年开始邀请谢家荣教授和我参加了他所主持的《中国含油远景区划图》的编制工作，这是我国最早的、系统的石油与天然气远景区划图。对非海相生油、盆地评价、综合研究及天然气工业每多有独到的见解。他对地球科学的物理、化学等基础理论问题进行了深入广泛的研究，提出了创造性的论点。

1966年邢台大地震后，他在周恩来总理的重托下，开始致力于天然地震的预测预报工作。80年代开始，又将预测工作扩展到洪涝干旱灾害的远程预测，并有《预测论基础》(1984)、《预测论》(英文版，1991)等专著发表。在预测理论和实践上取得了重大突破。

应当着重指出，近年来翁文波致力于全球性地震超远程预测和中国长期气候预报，都取得了令人瞩目的成果。特别是对1992年6月28日美国加利福尼亚大地震预测以及对我国南方1991年大洪涝灾害预报之成功，引起了有关方面专家们的重视（见地球物理学报，第35卷第6期，1992年11月）。我们希望政府有关部门领导大力支持翁文波的预测工作，配合国家地震局和国家气象局，把预测事业推向前进。

翁文波教授是我的挚友，1942~1943年间，我们共同在新疆天山南北进行油田及其他矿产的调查。其间，艰苦风趣的共同生活、彼此默契的工作配合，得以获得重要的地质考察成果，至今仍记忆犹新。50年代初期，又共同切磋勾绘我国油气勘探远景的蓝图。喜看今日油气工业的大好形势，更勾起我对往日的美好回忆。尔后，我长期以石油工业部顾问的身份与翁教授过从甚密，深知其为人诚恳宽厚，处世淡泊名利，治学态度严谨；特别是勇于创新、敢于超越的精神是他最突出的品质。令人高兴的是《翁文波学术论文选集》这一巨著得以出版，为我们提供了极为宝贵的财富和学习的榜样。在文集即将付梓之际，特表祝贺，谨以此为序。

黄汲清

1992年8月17日

编者前言

翁文波教授自 1934 年以难度颇深的天然地震预测论文毕业于清华大学物理系以来,对地球科学就特别给予关注,至今已近 60 年。在此期间,撰写了近百篇论文、报告和专著。这些论著不仅反映了翁教授的学术成就,也从一个侧面反映了我国在这些领域的研究水平。因此有必要加以汇集总结。为此,中国石油天然气总公司于 1992 年 2 月在庆贺翁老八十寿辰之际,决定成立《翁文波学术论文选集》编辑委员会,责成石油勘探开发科学研究院会同石油工业出版社编辑出版。为此,我们选收了 1992 年上半年以前的 50 篇论著,分为地球科学、石油科学和预测科学三篇汇集成册编辑出版。

地球科学的 4 篇论著着重从地球的物理化学性质及其与天体的相互关系阐述地球发展的基本理论问题,创造性地运用园谐函数分析法,探讨了地球形态的发展规律。认为用纬度观测结合其它方法是研究地球水准面变化和岩石圈构造运动的有效方法。在有关原子核性质的研究中,从同位素周期性的假说出发,提出了一个原子质量的经验公式,估算了地球上元素的年龄为 5.2×10^9 年,并讨论了油气田上可能有放射性异常的设想。

在石油科学方面,翁老于 1948 年通过研究煤炭定碳比率带,明确指出了包括东北、华北在内的低变质区可望找到油气的预见。进而撰写了 10 多万字的《中国石油资源》专著。同时对世界油气田的分布规律进行了宏观分析。在上述研究基础上,于 1953~1955 年初与黄汲清教授、谢家荣教授和邱振馨同志一道主持编制了我国最早的全面系统的含油远景分区图,为我国油气勘探的战略布局提出至今仍有指导意义的蓝图。此外对于非海相沉积生油、盆地评价、天然气工业等方面都进行了广泛研究,表述了独到的见解。

1966 年邢台发生强烈地震,敬爱的周总理视察灾情回京之后,当即嘱托翁教授前往灾区调查研究,在此期间耳闻目睹深感责任重大。遂除继续石油科学的研究外,潜心研究包括天然地震在内的天灾预测工作。以其渊博的知识领域、深厚的数理基础、勇于探索创新的精神,设计了浮动频率研究方法作为预测未来远程灾害的重要手段之一。翁老还把天文学中首先提出而常被人们遗忘的“可公度性”扩展到预测科学领域,取得了良好的效果。其计算油田储量预测公式“旋回模型”曾被誉为“Weng—旋回模型”。与此同时,还系统地撰写了《预测论基础》、《预测论》(英文版)专著,其英文版部分内容已被国外某大学编入教材。以灾害地震预测而论,有的报刊评价“翁文波预测天气十拿九稳”。再以天然地震预测来说,近 10 多年来世界和我国百余次较大地震中,言中者十之八九。以最近的 1992 年 6 月 28 日美国洛杉矶发生的大地震为例,预报震级、地点相当吻合,仅时间推迟了 9 天,其预测的结果有很高的置信水平。

本文集每一部分的各篇文章以写作时间为顺序进行编排,每篇文章在篇名处以脚注形式注明文章出处。在预测科学部分,为证实预测的准确性,摘选了部分报刊文章,并加了部分编者按,以说明文章的写作背景。在所选编的 50 篇论著中,由于著作时限较长,原有的一些科学术语、地名译文、计量单位不尽一致,在编辑过程中有些作了必要的调整;有的保留了原貌,以脚注加以说明,但均忠于原作内容。编辑出版工作是在研究院翟光明、出版社陈炳泉具体指导下进行的。张清、张传淦、安作相担负了选编工作。吕牛顿、钱绍新对文集的

数理部分进行了仔细的校核推敲；宋建国、高维亮、牛瑄、徐旺、薛超对编辑工作提出了宝贵的意见，吴修沛清绘了图件、整理了部分稿件，在此谨致以衷心的感谢。由于编者水平有限，疏漏错误之处恳请读者指正。

编 者

1993 年 2 月于北京

EDITOR'S FOREWORD

Since Professor Weng Wen-Bo graduated from the physics department of Qinghua University with a rather difficult thesis on the earthquake forecasting in 1934, he has paid special attention to the geoscience for nearly sixty years and written nearly one hundred papers, reports and special works, which not only reflect the scientific achievement of Prof. Weng himself, but also from one aspect reflect the research level in these area of our country. Therefore, it is necessary to compile and publish his papers and reports.

In February, 1992, China National Petroleum Corporation, while celebrating the 80th birthday of Prof. Weng decided to set up an editorial board for "Selections of Weng Wen-Bo's Academic Papers" and assigned Research Institute of Petroleum Exploration and Development and Petroleum Industry Press to publish this selections. The selected papers are classified into three parts, i.e. Geoscience, Petroleum science and Forecasting Science.

The four papers of geoscience state the basic theory on the development of the earth according to the physical and chemical characteristics of the earth and its relation with other celestial bodies. Prof. Weng has creatively applied the method of harmonic function analysis to study the development of earth configuration and proposed to use the latitude observation in combination with other method as an effective method for studying the variation of the earth level surface and the movement of the lithosphere. In the study on nucleus properties an experiential equation is proposed based on the hypothesis of isotopic periodicity. By means of this equation, the age of element on the earth was estimated at 5.2×10^9 years. The possible existence of radioactive anomalies in oil and gas field was discussed in this study.

In the area of petroleum science, through his study on carbon ration of coals in 1948, Prof. Weng predicted that oil and gas could be found in the low metamorphic area of northeastern China, northern China and others. After this, he compiled a book titled "China Petroleum Resources" in more than 100000 words. In the mean time, he made a global analysis of the distribution characteristics of oil and gas field in the world. Based on the results, working together with Prof. Huang Ji-Qing, Xue Jia-Rong and Qiu Zhen-xin, he chaired the compilation of the China's earliest and integrated petroleum prospect area map, a blueprint of significant importance in guiding the petroleum exploration strategy of our country. Moreover, he has made widespread studies and gained some original opinions on oil generation in non-marine formation, basin evaluation, natural gas etc.

In 1966, entrusted by respected Premier Zhou Enlai, Prof. Weng went to Xingtai area, where a serious earthquake just happened, to make an investigation. The facts heard and seen during the investigation made him feeling the great responsibility on his shoulder. Since then, in addition to the research on petroleum science, he has worked with great concentration on the forecasting of natural disaster, including earthquakes. With his broad and profound know-

ledge, solid foundation in mathematics and physics and the spirit in exploring forth new ideas, Prof. Weng has developed a series of method, such as fluctuating frequency and commensurability method. All these methods have been applied successfully to the long-range forecasting of disasters and have got good results. His prediction equation of cycle model for estimating oil reserve, is honoured as "Weng-cycle model". In this period, he published his special work "Fundamentals of Forecasting Theory" some parts has been adopted by some foreign university as teaching material.

In the course of forecasting of more than one hundred large and moderate earthquakes that happened during the last decade in the world and China, most cases are successful. As an example, the forecasting of the large scale earthquake in Los Angeles U.S.A on 28 June, 1992, was accurately predicted in its magnitude and location, only with date being delayed by 9 days, Showing the high confidence level of the forecasting.

During the compilation, the selected papers are ordered according to their written date, with a note to indicate the origin of the paper. In the part of forecasting, some articles from newspaper are quoted to show the accuracy of forecasting and also with editor's notes to indicate the background of the articles. Some originally used scientific terms, translation of place name, measure units in these fifty papers have been modified with the modern usage, while some terms are kept in their original with explanatory notes. All these modifications are assured to be true to the original. The editing job is done under the guide of chief compiler Zhai Guang-Ming and associate chief compiler Cheng Bing-Qian. The selecting and editing job is made by Zhang Qing, Zhang Chuan-Gan, An Zhuo-Xinag and Lu Niu-Dun, Qian Shaw-Xin, Song Jiang-Guo, Gao Wei-Liang, Niu Xuan, Xu Wang and Xue Chao have made valuable suggestions and help in the editing. Wu Xiu-Pei drew the figures. We would liked to thank them here. Without doubt, this selections can be improved. If you have comments, or suggestions, We would be pleased to have them.

Editor Board
February, 1993, in Beijing

PREFACE

Professor Weng Wen-Bo is a famous geophysist and petroleum geologist of our time, he is also a well-known expert in forecasting theory. Already in 1934 when he graduated from the Qinghua University, he wrote "Earthquake Forecasting" as his bachelor thesis. Since then, he has a close relation with the geoscience. In 1936, when he studied applied geophysics in Imperial College of London University, he did a bold exploration in the study of gravimeter, finally designed and made a gravimeter.

He came back to China with a Ph. D. degree in 1939 during the war-ridden year against Japan. The journey was so hard that almost all of things carried by him were lost, but the gravimeter survived with his best care. In the early of 1940's, he used this gravimeter to initiate China's earliest petroleum gravitational prospecting along the He Xi Corridor and on the north and south of Tian Shan Mountain. After this, he made magnetometer and logging instrument, he established and led the first gravitational crew and seismic crew in China. He is the pioneer of Chinese geophysical and petroleum prospecting career.

During the period from late 1940's to early 1950's, Prof. Weng completed number of papers, such as: <Oil prospects in China as Related to Carbon Ration>, <The Distribution Characteristics of World Oil Fields>, <Chinese Petroleum Resources> etc. In 1953, he invited Prof. Xue Jia-Rong, and me to take part in the editing of <China Petroleum Prospective Map>, which he was responsible for. This is the earliest and systematically compiled oil and gas prospect map in our country. In the comment of this map, there are many original views on non-marine oil generation, basin evaluation, comprehensive research and natural gas industry. Based on his in-depth and widespread studies on basic physical and chemical fundamental of geoscience, he proposed a lot of creative opinions.

After the Xingtai earthquake of 1966, entrusted by Premier Zhou Enlai, he devoted himself to the forecasting and prediction of earthquakes. From the beginning of 1980's he extended the research to the long range forecasting of natural disasters, such as flooding and drought. He published <Fundamentals of Forecasting Theory> which provided a significant break through in forecasting theory and practice.

In the last several years, notable results have been made by Prof. Weng in the studies on basic forecasting theory and on the measurability, in the forecasting of worldwide earthquakes and in the long range weather forecasting in China. The successful predication of the great earthquake in California U.S.A. on 28 June, 1992 and the serious flooding in the southern part of China in 1991 has particularly drawn concerned experts attention in the world (please refer to the Acta. Geophysica Sinica, Volume 35, No. 6, Nov. 1992). We hope that the Leaders of related departments will support Prof. Weng's work which in cooperation with the National Earthquake Bureau and National Meteorology Bureau will push forward

the enterprise of forecasting.

Prof. Weng is one of my close friends. We worked together during 1942–1943 in the investigation of oil and other mineral deposits on the north and south of Tianshan Mountain in Xingjiang. We shared the days with difficulties but full of humour and were cooperated very well, and got important results in the geological investigation. All these are still remained fresh in my memories. During 1950's, We once again worked together to discuss and outline the blueprint of Chinese petroleum prospect. The situation of petroleum industry of our country is so well that evokes my memories of the glorious past, in that time, as a consultant of the Petroleum Ministry, I was in close association with Prof. Weng. well understanding his sincerity and generousness to people not seeking fames and wealth meticulous scholarship, and especially his spirit of being hold in making innovations. The publication of the monumental work <Selections of Weng Wen-Bo Academic Papers> is a cheerful event, which provides our country a valuable wealth and a learning example. I congratulate this happy event with this preface.

Huang Ji-Qing (T. K. Huang)

17 August, 1992

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