石油地质进展丛书 5

Advances in Petroleum Geology Series 5

中国油气藏研究

Study on Oil & Gas Reservoirs of China

中国石油学会石油地质委员会编

Edited by Petroleum Geology Institute of Chinese Petroleum Society

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内 容 提 要

本书是在1986年全国油气藏勘探学术讨论会议上 从宣读的论文中选出来的28篇具有一定学术水平和代表性的文章之汇集，它基本上反映了我国当前对油气藏的研究成果和水平。内容包括我国各种油气藏的成因、分类、特征和分布规律以及如何对其进行勘探、预测，既有丰富的实际资料，又具理论见解。它可供从事石油地质勘探、科研和教学人员参考。

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中国石油学会石油地质委员会 编
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序

中国石油学会石油地质委员会自1979年成立以来，举办了多种形式的学术交流活动，不仅活跃了学术空气，而且对发展我国石油地质学理论和油气勘探工作起到了一定的促进作用。在各种专业学术会议上，交流和宣读了大量具有较高理论水平，并能够指导油气勘探工作的论文和科研报告。但由于石油地质委员会没有与其学术活动相适应的公开刊物，以及受到各方面条件的限制，只有极少量的论文得以出版，而更多的优秀论文和科研成果未能编纂成册，给科研、生产、教育部门的利用带来不便，实为可惜。

为了更好地促进学术交流，不断提高我国石油地质学术水平，推广科技成果，系统地积累各类学术资料，为油气勘探、科学研究和人材培养服务，石油地质委员会决定自1985年起编辑出版《石油地质进展丛书》，我们将选择各种专业学术会议上交流的具有较高理论水平和实际应用价值，并能代表国内外科学技术发展方向的论文和科研成果，按石油地质构造、地层古生物、沉积相与沉积环境、油气生成及有机地球化学、油气藏形成、资源评价以及地震测井、遥感技术、数学地质、实验技术等专题编纂成册，交石油工业出版社出版、发行。

中国石油学会名誉理事长康世恩同志为《石油地质进展丛书》题词："石油地质科学研究要展望未来"，对编辑出版这套丛书寄予很大的希望和提出了很高的要求。我们将本着这一精神，努力探索，开拓石油地质学的新领域。我们将把《石油地质进展丛书》作为反映我国石油地质理论进展和油气勘探实践的窗口，并使之成为石油地质科学研究和生产实践之间的一座桥梁，起到指导油气勘探工作的作用。

在我国新的历史时期中，为实现四个现代化的宏伟目标，加速发展我国的石油工业，用先进的石油地质学理论、先进的油气勘探技术和方法，对我国油气资源进行全面的预测和评价，指出油气勘探方向和有利的油气富集区，是我会组织各种学术活动的宗旨，我们将遵循"百花齐放，百家争鸣"的方针，提倡不同学术观点的讨论，在《石油地质进展丛书》上刊载不同学派的科研成果和学术论文。欢迎广大石油学会会员和各有关部门及单位的石油地质科学工作者，积极发表独到的见解、观点和创造性的成果，为繁荣我国石油科技事业，为发展我国石油工业作出卓越的贡献。

中国石油学会石油地质委员会

1985年3月

Preface

Since the founding of the Petroleum Geological Institute of the Chinese Petroleum Society in 1979, different forms of academic activities have been organized to make provisions for its members to exchange their learnings which have not only created a lively academic atmosphere among the members but also acted as a catalyst in the development of petroleum geology both in theoretical research and in practical exploration. Large numbers of papers or findings have been presented to or read in the different symposiums which win the consensus of having fairly high theoretical level, capable of guiding field work. Due to the lack of a publication of its own and limited by many other factors, only a very few of the articles have been selected and published, leaving many of the equally outstanding papers aside, which is quite a big loss to the research, production as well as educational institutions

As a way out, the Petroleum Geological Institute has decided to edit, starting from the year 1985, this publication called "Advances in Petroleum Geology Series", in order the better to promote academic exchanges, raise the level of petroleum geological science, propagate research results and accumulate, in a systematic manner, materials on different subjects for the use of explorationists, research workers and teaching personnel. The primary source of articles will be those from the symposiums organized by the Petroleum Geological Institute which are considered to be outstanding both in theoretical level and in practical value, and representative of the scientific achievements and trend of development of geological science at home and abroad. The subjects to be covered by the series will be: petroleum geological structures, stratigraphic paleontology, sedimentary facies and sedimentary environment, origin of oil and organic geochemistry, formation of oil and gas pools, appraisal of resources, as well as seismic survey, well logging, remote sensing technique, mathematical geology, experimental techniques etc. It is a specialized publication of open circulation, published in series by the Petroleum Industry Press.

In commemorating the first issue of "Advances in Petroleum Geology Series", Comrade Kang Shien, Honorary Chairman of the Board of Directors of the Chinese Petroleum Society, sends us his words of encouragement saying: "The research in petroleum geology should aim at forecasting the future". These words have placed a very high demand on the publication of the series.

And in the spirit of these words, we should make efforts to explore and unremittingly to open up new areas for the development of petroleum industry, and through the publication of this series as a window to reflect our progress and as a bridge to link scientific research with production, guiding our way in the search of oil.

In this our new historical epoch, with the realization of four modernizations as our grand goal, we, as workers of the petroleum industry, must direct all our academic efforts toward speeding up the development of the industry through the introduction of advanced geological theories and application of advanced exploration techniques, so as to do well the work of resources forecasting and appraisal and of locating abundant oil and gas accumulations. We will stick to the policy of "letting a hundred flowers blossom and a hundred schools of thoughts contend". Discussion of different views and different schools of thought will be encouraged, and scientific treatises and academic papers from different schools will be accepted and published. Members of the Chinese Petroleum Society and petroleum geologists from related departments are welcome to make their contributions for a common causea flourishing petroleum science and a prosperous petroleum industry.

Petroleum Geological Institute
Chinese Petroleum Society
March, 1985.

前　言

含油气盆地中油气藏分布的现存状态，大都受到盆地演化过程中多次构造变形和储集层纵横向上的变化及其保存条件的作用，而由原始状态演变而成的。在这一过程中，每一个地质要素对于圈闭成一个特定油气藏都是极为重要的。石油地质勘探工作者力图在发现油气藏之前，就能够根据这些地质要素确定成油组合的有利地区并发现其规律性，为寻找油气圈闭指出方向。中国石油学会石油地质委员会基于这一勘探实践的需要，曾于1983年召开了“隐蔽油气藏勘探学术会议”；1984年召开了“基岩油气藏勘探学术讨论会”；1986年又召开了“全国油气藏勘探学术讨论会”。这些学术活动都是从不同类型的油气藏形成机制及其演化来探讨新的油气勘探方向。

在全国油气藏勘探学术讨论会议上，从事油气藏研究的专家、学者们，全面系统地总结了不同类型盆地的油气藏类型、复式油气聚集带、油气藏成因机理及分布规律。这次会议的论文较全面地反映了我国当前在油气藏研究领域中的实际水平，对于中国石油地质学和油气勘探事业的发展具有重要的意义。

含油气盆地是由一个相对独立的沉积体系组成的地质体，它的发生、发展和形成经历了统一的构造演化史、沉积发育史、地热演化史和油气聚集过程，并对盆地的油气藏类型、含油层系结构和油气富集程度起着主导作用。中国中、新生代含油气沉积盆地是在不同古地质构造单元体制下形成的，由于所受地球动力作用的不同，形成的沉积盆地类型也就不同，这些含油气盆地相互分隔并自成一个独立的沉积单元和成油体系。不同类型的盆地有其自身的沉积模式、成油组合类型、成烃模式和油气圈闭模式，并形成了各自的油气藏和复式油气聚集带的分布规律。由于陆相含油气盆地油气分布规律的差异性大于相同性，所以只有搞清含油气盆地自身的特殊成油规律，才能有效地指导油气勘探实践。

中国中、新生代沉积盆地具有多旋回和多层结构的特点，按盆地成因可分为西部挤压型、东部拉张型和中部克拉通坳陷型盆地。盆地类型不同，构造类型和盆地模式也就不同：西部盆地为逆冲带—背斜带—斜坡带—隆起带；东部盆地为陡坡断裂带—坳陷带或坳陷隆起带—缓坡带；中部盆地为逆冲带—向斜背斜带—单斜带。这对区域性的油气富集带和油气藏类型起着一定的控制作用。

生油环境是受多凹陷中心控制的，凹陷中有机质有规律地呈环带状展布，一个生油凹陷中心控制着油气富集和油气藏在空间的展布。盆地生油岩系的母质类型及其演化程度控制着油气的丰度及油气富集的程度。

陆相湖盆沉积属河湖沉积体系，控制着多种沉积类型和多种储集岩体成因分布，在空间上不同类型储集岩体呈环带状分布，在剖面上相互叠置。主要储集岩类有碎屑岩、碳酸盐岩、火山岩和变质岩。碎屑岩储集体的物性受沉积相带和成岩后生作用因素的控制；碳酸盐岩物性与古岩溶和构造断裂活动强度有关；火山岩的物性多与裂隙或中心式喷发有关；变质岩物性与受断块控制的风化壳有关。

不同类型的盆地有着不同的油气藏模式：有断陷型油气藏分布模式，如渤海湾盆地等；有坳陷型油气藏分布模式，如松辽盆地等；有克拉通坳陷型油气藏分布模式，如鄂尔多斯盆

地等；也有挤压型油气藏分布模式，如准噶尔盆地等。在油气藏组合即储集岩与有效生油岩体在时空的配合关系上有下生上储成油组合、自生自储成油组合及新生古储和上生下储成油组合。在纵向上油气藏的分布受盆地温度和压力条件的控制，自上而下油气的序列为次生气藏—次生凝析气藏—油气藏—油藏—凝析气藏—纯气藏。但由于古构造、古地理和地球化学条件不同，序列发育不完整，一般情况下有：①气藏—凝析气藏—油藏—凝析气藏；②单一油藏；③气藏—凝析气藏—油藏；④油藏—凝析气藏—气藏；⑤气藏—油藏。

经过学者们的讨论，对采用“油气圈闭成因”的油气藏分类方法取得了比较一致的看法——有的分为3大类（构造、地层、岩性）15亚类；有的分为4大类（构造、地层、岩性、复合）21亚类；有的分为5大类（构造、地层、岩性、流体、复合）26亚类。这种数量上的差异，是学者们从全国不同含油气盆地出发，对油气藏勘探实践的总结，对各含油气盆地油气藏预测和勘探方法的选择有很大的实用价值。

在会议上，专家、学者们还讨论了“复式油气聚集带”的概念。由于中国含油气盆地是属于不同时代盆地的多旋回叠加，包括沉积旋回和构造旋回的叠加，又加上块断活动造成同向或反向的逆冲与滑脱，反映了许许多多的“叠瓦式”的重叠关系，正是这种复杂的叠加关系，造成了生油岩和被封闭的储油岩在油气运移的地质历史时期相互交接和沟通，形成了多层系含油和复式的聚集带，这是对含油气盆地油气勘探实践的科学总结。

油气藏地质学是一门综合性的应用科学，在油气勘探中应根据盆地构造类型、沉积相、生油源岩、热演化史和油气圈闭的分布特征来预测盆地油气富集区，制订不同的勘探方法和勘探程序，以提高勘探成效和经济效益。

专家们认为，在今后的油气勘探工作中，要向新地区、新领域、新类型和勘探的深度推进，要进一步加强油气藏形成规律方面的研究，为发现更多的油气资源做出贡献。专家们建议应加速对渤海盆地潮间带地区、辽东湾地区、黄河口地区和莱州湾地区的勘探。在西北地区，含油气盆地面积大、含油气层系多、勘探程度低，是寻找油气田最有远景的地区，如准噶尔盆地东部、塔里木盆地的塔北隆起和中央隆起、柴达木盆地的茫崖凹陷和鄂尔多斯盆地中央隆起两侧地带等。在勘探构造油气藏的同时，还应该大力加强对非构造油气藏领域的勘探，尤其是在勘探程度高的地区，如济阳凹陷、辽河凹陷、黄骅凹陷、东濮凹陷、冀中凹陷和苏北凹陷等，应广泛采用高精度的物探和地震地层学方法，提高勘探成效。

这本论文集收入了这次会议上学术水平较高并对勘探实践有指导价值的论文28篇，汇编成一部较全面、系统的油气藏研究方面的文集。

田在艺

一九八七年十二月

Foreword

The current state of oil and gas pools in petroleumbearing basins is largely controlled by multi-structural deformation, vertical and lateral changes of reserviors and their preservation conditions as well, during the evolution of basins. In this process, it is significantly important to form a specific hydrocarbon reservior for every one of these geological factors. Petroleum geologists have tried their best to anticipate the prospective oil-generating area and find distribution of reserviors in the light of these factors, before the hydrocarbon reserviors are discovered in petroleum exploration. According to the exploration needs, the Petroleum Geological Institute of the Chinese Petroleum Society has organized the academic meetings of exploration for subtle traps and basement hydrocarbon reserviors respectively in 1983 and 1984. Another academic meeting on the similar theme has also been held in 1986. In order to provide new prospect for finding hydrocarbon traps, these academic meetings have discussed the new prospect of petroleum exploration based on the mechanism forming different types of hydrocarbon reserviors and their evolution.

Experts and scholars in this academic meeting have systematically and wholly concluded the classification of oil-gas reservoirtraps, complex zones of hydrocarbon accumulation, genesis mechanism and distribution of hydrocarbon reservoir traps in different types of basins. The attending experts reckoned that the papers presented in this academic meeting wholly reflected the real level in the research on the hydrocarbon reservoirtraps of China, and it is of important significance to develop the petroleum geology and petroleum exploration of China.

Hydrocarbon-bearing basin is a geological body consisting of relatively isolated sedimentary system, its beginning, development and formation have experienced a uniformed tectonic evolution, sedimentary history, geothermal evolution and accumulation process of oil and gas, which make control over the main types of hydrocarbon reservoirtraps, structures of oil-bearing beds and the content of hydrocarbon accumulation. The hydrocarbon-bearing basins of Meso-Cenozoic in China have been developed on the background of different tectonic units in geological ages, the types of them are differnet because of the different geodynamics they experienced. These hydrocarbon-bearing basins are seperated from each other and each of them is a isolated sedimentary unit and hydrocarbon-generating system. Different types of basins

have their own sedimentary, hydrocarbon generating combination and trapping models, thus the distribution of hydrocarbon reservoirs and the complex zones of hydrocarbon accumulation have their characteristics in different basins mentioned above. Because the differences of hydrocarbon distribution in continental hydrocarbon-bearing basins are much clear than their generalities, we can effectively guide the petroleum exploration after the specific hydrocarbon-generating rule of hydrocarbon-bearing basins are made clear.

Sedimentary basins of Meso-Cenozoic in China are characteristics of multi-cycle and multi-paybed. The basins may be classified as the compressive in the west, the extensive in the east and the craton-depressed in the central part of China. Differnet basins have differnet models and structures of itself. For instance, the basins in the west are thrust zone-anticline zone-slope zone-uplift zone, the basins in the east are steep slope faulted zone-depression or depression-uplifted zone-gentle slope zone, the basins in the central part of China are overthrust zone-sycline and anticline zone-monocline zone. These models have made certain control over the regional accumulation zones and main types of hydrocarbon reservoirs.

Generally speaking, the hydrocarbon-generating environment was controlled by the centers of multi-depression, where organic materials spread in cycle, so hydrocarbon accumulation and reservoir distribution in space were controlled by every center of hydrocarbon-generating depression. Hydrocarbon richness and accumulation content depended on the types of source rocks and its maturity.

The deposits in a continental lacustrine basin consist of fluvial-lacustrine depositing system which controlled the multideposit types and reservoir distribution of various genesis. Differnet types of reservoir beds laterally distributed in circling forms and vertically overlapping. The reservoirs are mainly clastic, carbonate, volcanic and metamorphic rocks. The oil-bearing properties of clastic reservoirs are affected by sedimantary facies and its post-diagenesis; carbonate are related to ancient Karst and its faulting activities; volcanics are associated with crack or center eruption; and metamorphic rocks are mostly found with weathering front.

Different basins have different reservoir models. They involve the followings: faulted-depression type, such as Bohai Bay basin; depression type, such as Songliao basin; craton depression type, such as Ordos basin; compressive type, such as Junggar basin. In reservoir combination, i.e., the match relations of reservoirs and hydrocarbon-generating source rocks spacially are as follows: newer reservoir rocks overlying elder source rocks; reservoir and source rocks being the same ones; elder reservoir rocks underlying newer source rocks. Vertically, the temperature and pressure of a basin controlled the

location of hydrocarbon reservoirs. With the depth increasing, reservoir order is as follows: gas-regenerated pool-condensate regenerated gas pool-oil and gas pool-oil pool-condensate gas pool-pure gas pool. But this order is not always so because of the differneces of ancient structures, geographical features and geochemical conditions, it is generally the following: (1) gas pool-condensate gas pool-oil pool-condensate gas pool; (2) pure oil pool; (3) gas pool-condensate gas pool-oil pool; (4) oil pool-condensate gas pool-gas pool; (5) gas pool-oil pool.

Having been discussed by the scholars, the relatively unanimous opinions to adopt the reservoir classification basing on the origin of hydrocarbon traps have been reached. Some classifications involve 3 categories (structure, stratum and lithology) involving 15 sub-categories, another 4 categories (structure, stratum, lithology and complex type) involving 21 sub-categories, as well as 5 categories (structure, stratum, lithology, fluid and complex type) involving 26subcategories. The classifications made by the petroleum geology scholars depend on the summarizing of exploring hydrocarbon reservoirs, of course, they are very useful to forecasting the reservoirs in different hydrocarbon-bearing basins and selecting the exploration methods.

In this academic meeting, the concept of "complex oil-gas accumulation zones" has been discussed, which is the scientific conclusion on petroleum exploration practice in China. This concept means that the hydrocarbon-bearing basins are characteristics of multi-cycle overlapping of basins in different ages, the overlapping involved multi-cycle sedimentation and deformation. In addition, block-faulting resulted in synthetic and antithetic reverse thrusting and detaching that suggested lots of overlapping phenomena called "imbricated type". Just for such complicated overlapping, source rocks and trapped reservoirs could be intersected and linked up during the geological age when oil-gas migrated, thus, multi-paybeds and complex accumulation zones were formed.

The geology of hydrocarbon reservoirs is a synthetic and applied science. Forecasting richly-accumulated area in a basin and making up different exploration methods and procedures should depend on the structural types, sedimentary facies, source rocks, geothermal evolution history and distribution features of traps so that exploration efficiency and economic benefit could be heightened greatly in petroleum exploration.

The experts has suggested that in the future petroleum exploration the advance be driven toward the new regions, fields, new-types and depth of exploration, the research on the forming rules of reservoirs be further done so as to make more contribution for discovering petroleum resources, and the steps be further fast in exploring the tidal areas of Bohai Basin, Liaodong Bay,

the mouth of Yellow River and the Laizhou Bay. The hydrocarbon-bearing basins in north-western part of China cover enormous areas, contain lots of paybeds but with much low exploration maturity, so their petroleum prospect is very great, such as the eastern Junggar basin, the Tabei(northern Tarim)uplift and the central uplift of the Tarim Basin, the Mangya depression of Chaidam basin and the both flanks of central uplift of Ordos Basin. We should pay great effort to the subtletrap reservoirs at the same time exploring structural ones, especially to the areas with high exploration maturity, such as the Jiyang depression, the Liaohe depression, the Huanghua depression, the Dongpu depression, the Jizhong depression and Subei depression, and so on. The methods of geophysical exploration and seismic stratigraphy should be widely used to heighten the exploration efficiency.

This symposium has selected 28 papers of much value in theories and for exploration activities. We expect this book to be a thorough and systematic volume concerning the petroleum reservoir research. The Petroleum Institute of the Chinese Petroleum Society is responsible for editing and publishing this book.

Tian Zaiyi
Dec. 1987

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田在艺　刘国壁　刘雯林

（原石油工业部石油勘探开发科学研究院）

前　言

油气圈闭与勘探是石油地质工作者在油气勘探历程中重点研究的课题之一。在一个含油气盆地内，在油气运移的时期内、在运移的道路上，任何储油圈闭都有可能捕获到一定量的来自于生油源岩中的油气，而形成各种不同类型的油气藏。这就是油气圈闭，但它同时依附于盆地的构造发展，并受时间和空间的制约，因而有着其固有的分布规律。石油地质家的任务就是探索并揭示这种规律性。然而，客观存在事物发展的规律性往往在一个很长的时间内不能被人们所认识。在19世纪70年代，人们是按油苗去寻找油田的。1885年，怀特首先提出了"背斜学说"，从而极大地推动了油气勘探工作的进程。在以后的大量勘探实践中，人们又认识到在非构造圈闭中同样可以找到油气藏；1963年莱复生在总结美国大量勘探资料的基础上，提出了"地层圈闭"（包括岩性圈闭）的概念，从而进一步开拓了勘探新领域，提高了勘探成效。在同一时期，人们还注意到油气圈闭的位置总是处于位能最小的地方，水的压头存在于地质体圈闭之外，于是赫伯特等人（1963）提出了"流体圈闭"的新概念。此外，随着地球物理勘探新技术的发展和应用，发现并查明了许多不同特点的油气圈闭类型，从而使人们的主观认识逐渐接近或符合于客观事物的固有规律。

我国经过多年的勘探实践，获得了丰富的资料，认识到在寻找油气圈闭及其分布规律时，首先应当搞清楚一个沉积盆地的地质构造单元及其发展历史、明确其构造模式、搞清盆地深坳陷的生油区及沉积相带、查明沉积模式，这样才能较清晰地分析出油气的圈闭类型和分布规律，并根据不同盆地不同构造单元和不同模式去寻找其各自的圈闭类型和分布规律。

一、构造式样及其组合模式

历史地分析我国各含油气盆地认识到：中、新生代以来，中国地质的显著特点是发育着一系列的陆相沉积盆地，这些盆地由于其所处的大地构造位置不同、所受的地球动力不同，因而各盆地的构造式样及其组合模式是相异的。

（一）裂陷型盆地

这类盆地主要分布于我国大兴安岭—太行山—雪峰山以东的地区，本区内由于地壳的裂张和扭裂作用后期表现为垂直差异运动，因而张扭性断层十分发育，断层的上部倾角较陡、深部倾角变缓，呈铲形。这些断层促使裂陷进一步扩展，形成一系列的箕状断陷，有的是单个箕状凹陷、有的是多个箕状凹陷，这种由断层控制的单断箕状凹陷是含油气盆地的基本地质构造单元。

盆地引张裂陷的初期，在水平拉张的区域性应力场作用下，盆地基底以掀斜垒堑断块活动为主，于盆地内部形成掀斜断块，每个断块体自身形成翘倾，当断层面倾向与原来基底的

区域倾向不一致时，即形成反向正断层，如辽河、东濮凹陷基底断裂；若与区域倾向一致时，则形成同向正断层，如江陵凹陷基底断裂。据对大量地震资料的分析发现，陡坡断阶带的发育与裂陷盆地不断引张向深处主干断裂面的弯曲变平关系极为密切。在侧向水平滑移运动下，常沿着新的滑动界面形成楔形断块，发育大型基底断层，形成箕状断陷深凹陷带。

在下第三系沉积盖层中，由于裂陷不断发育和沉积物的压实，在重力作用下普遍发育着一系列生长正断层，其下降盘的沉积速率常常大于上升盘的速率，由于重力牵引，便产生滚动背斜。有时在沉积岩层中沉积有巨厚的塑性岩层如膏岩、盐岩、泥岩层等，由于塑性岩核的浮力上升，产生挤入褶皱，使上覆岩层发生拱曲拉伸，并在褶皱构造的顶部产生小型地堑，这又是一种塑性层变形模式——即所谓盐（泥）丘构造。当裂陷盆地发展到后期，引张与裂陷幅度较弱，盆地逐渐隆起，此时可能产生微弱的挤压应力，形成平缓的压性构造。由上论述可以看出，在不同的构造层次中，可形成不同的构造式样，即深层应为断块构造，中层应为生长正断层、逆牵引滚动背斜和盐（泥）丘构造，浅层则为平缓的披覆构造。

单断箕状式的裂陷在渤海湾、苏北、江汉等盆地发育良好，在平面上的组合分布是由正断层下降盘形成的陡坡带、深凹陷槽和另一侧的缓坡所组成，凹陷中心多偏向主断层一侧。在陡坡一侧，由于断层的拉张与沉积的载重作用，沿着断层的下降盘形成了一系列同生断层和逆牵引背斜。在深凹陷中，由于边界断层所产生的侧向挤压应力而形成了背斜构造。在缓坡一侧多形成地层超覆或侵蚀不整合接触，并常为同向或反向正断层组成的断阶带所复杂化，形成一些小断块。

（二）坳陷型盆地

松辽盆地是一个典型的坳陷型盆地。松辽盆地按所处的大地构造位置，同中国东部的其它地区一样，是在张性裂陷的构造应力场环境中产生的。但由于其后期在成油过程中是一个稳定的坳陷式的下沉阶段，所以在构造式样及其组合模式上与渤海湾盆地截然不同。从它的形成和发展来看，各时期构造运动表现的形式是：早期裂陷，中期坳陷，晚期隆起褶皱。

松辽盆地侏罗系及早白垩世早期登娄库组深层构造特征是由许多断距较大的正断层切割组成的，并形成地垒、地堑相间的裂陷带。在地堑和断阶带构造发展的基础上，形成幅度较小的次一级断块、断鼻和短轴背斜构造。

白垩系泉头组—嫩江组的中层构造特征为平缓褶皱的大型坳陷。此期为大型沉积坳陷发育的极盛时期，从泉一段开始，沉积范围扩大，至嫩江组二段时，沉积范围扩大到今日全盆地范围。由于后期表现为垂直差异运动，故盆地内变形作用不显著，只形成背斜、向斜相间的平缓构造，两翼倾角一般小于5°。由于盆地总的趋势是东高西低，所以背斜不对称，向坳陷的一侧较陡，背坳陷的一侧较缓，局部构造多为短轴背斜、穹隆和鼻状构造，同时发育着断距较小的正断层。有些断层是生长断层，伴生着滚动背斜，还有些断层则是后生的。而后经历晚白垩世与早第三纪或早、晚第三纪之间的两次构造运动，由于伴随着地壳上升的差异运动，因而在一些长期隆起的顶部如大庆长垣，上白垩统及下第三系地层明显减薄或缺失；但嫩江组末期所形成的背斜、向斜平缓褶皱带只是进一步发育完整；并且其上、下构造形态基本一致。

松辽盆地在空间上的构造组合模式是有一定规律的。在古龙—长岭深凹陷以西，是一个大面积的东倾平缓斜坡，地层倾角一般小于1°。由于是一个长期发育的古斜坡，地层厚度由东向西逐渐超覆减薄，故斜坡上未见褶皱构造，只有一些小型构造或鼻状构造零星分布。在斜坡与深凹陷的交界处，存在一个挠曲带，地层倾角5°～10°，有时发生断折。在深凹陷以东