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中非剪切带含油气盆地成因机制与构造类型

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Genetic mechanisms and tectonic types of petroliferous basins in the Central Africa Shear Zone

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摘要

位于非洲大陆的中非剪切带盆地群,受控于周邻板块的构造运动,盆地形态多样,多具有走滑-反转等构造样式,近年来发现了一系列大中型油气田,已成为全球的热点勘探地区。以地震、钻井资料为基础,结合平面上的盆地形态和构造地质横剖面特征,应用构造应力场概念和构造解析方法,详细探讨了剪切带盆地的成因机制和构造类型,并进一步揭示了盆地的形成演化对油气地质条件的控制作用。研究认为,受周缘板块构造的影响,中非剪切带盆地群自早白垩世以来,发育多期叠加的构造-地层序列,经历了3幕裂谷作用:1以右旋走滑拉张性质的第一幕最为剧烈,是盆地群的原始动力和决定性因素;2第二幕裂谷作用的影响较小,强度自东向西减弱;3裂谷期为第三幕,主要影响了东部的盆地。结合平面及剖面上的走滑应力场变化特征,将早白垩世的中非剪切带盆地群划分为3种成因类型:T-R型盆地、T-R'型盆地、S/P型盆地(其中T、R、R'、S、P分别表示张裂面、里德尔剪裂面、共轭里德尔剪裂面、挤压面及走滑低角度破裂面),整体在剪切带上组合成一套完整、配套齐全的走滑盆地群体系。在盆地群3幕裂谷作用中,这种成因差异性的构造演化特征,发育多种圈闭类型,油气富集特色鲜明:东部盆地是最有利的油气聚集区;西部盆地中也具有广阔的油气勘探前景;中部盆地由于控盆断裂较为复杂,其潜力有待进一步揭示。

关键词: 走滑断层, 成因机制, 构造类型, 油气聚集, 中非剪切带, 裂谷盆地

Abstract

The basins group, located at the Central Africa Shear Zone in African continent, shows diversified morphologies as controlled by the tectonism of surrounding plates, mainly presenting the tectonic styles such as strike-slip and reverse structures, etc. In recent years, a series of large and middle oil and gas fields have been found as the global hot spots for exploration. Based on the seismic and drilling data of petroliferous basins in Central Africa Shear Zone, in combination with the characteristics of planar basin morphology and tectonic geological cross profile, the genetic mechanism and tectonic types of these basins were deeply explored using the concept of tectonic stress field and structure analytical method, so as to further reveal the controlling influence of basin formation and evolution on hydrocarbon geological conditions. It is considered in this study that affected by the structure of surrounding plates, multi-stage superimposed tectonic-stratigraphic sequences were formed in the basins group since the Early Cretaceous, experiencing three episodes of rifting. Episode 1 shows the most intense rifting with right-lateral strike-slip tensile property, and is the original motive and decisive factor for basins group; the rifting of Episode 2 had less influence with the intensity weakened from east to west. The rifting period exists in Episode 3, and mainly has influences on the development of Eastern Basins. In combination with the variation characteristics of strike-slip stress field on the plane and profile, the Early Cretaceous basins group in Central Africa Shear Zone can be divided into three genetic types: T-R type basin, T-R' type basin and S/P type basin (T, R, R', S and P represent tension fissure plane, Riedel shear fracture plane, conjugate Riedel shear fracture plane, compressive plane and low-angle strike-slip fracture plane respectively). As a result, a set of complete strike-slip basin system with comprehensive support was created in the shear zone as a whole. In the three episodes of basin rifting, multiple trap types were developed due to the tectonic evolution with genetic differences. They have distinctive hydrocarbon enrichment characteristics, i.e., Eastern Basins are the most favorable hydrocarbon accumulation zones; Western Basins also have broad hydrocarbon exploration prospects; due to complex basin-controlling faults, the potential of Central Basins remains to be discovered further.

Key words: strike-slip fault genetic mechanism tectonic types hydrocarbon accumulation the Central Africa Shear Zone basins rifting basin

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