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裂陷盆地断层的形成和演化——目标砂箱模拟实验与认识 [点此下载全文](#)

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摘要:

摘要 断层的分布、活动和演化是裂陷盆地构造研究的核心,也是其油气勘探的关键。大量高精度的三维布组合十分复杂,无法用经典构造地质学理论——Anderson模式作出合理的解释,现有的模式(叠加模式和斜向示裂陷盆地断层复杂性的实质和断层形成和演化的内在规律。本文以渤海湾盆地张巨河构造带和北部湾盆地涠洲料覆盖、断层分布与组合十分复杂并富含油气的典型裂陷盆地地区为原形,进行了目标砂箱模拟实验,再现了目标揭示裂陷盆地断裂系统的基本特征是:1)基底先存构造(主要所控制的断层构成了盆地断裂系统的基本格架; ;先存断裂的取向、区域伸展方向及伸展量。首先形成的是有刚性边界基底先存断裂控制的断层。其次,形成的是层。继而,形成的是小型基底先存断裂控制的断层。最后,在远离基底先存构造的区域,形成与伸展方向垂直的断层的方位主要决定于基底先存断裂的方位。随着伸展量的增大,受伸展方向的影响越来越大,晚期形成的断层不协调递进伸展变形过程是导致裂陷盆地复杂断层体系的根本原因。上述砂箱模拟实验揭示的裂陷盆地在不协调规律可以利用“不协调性准则”从理论上给予解释,表明在裂陷盆地中具有普遍意义。

关键词: [不协调伸展](#) [裂陷盆地](#) [砂箱实验](#) [先存断裂](#) [形成演化](#) [“不协调性准则”](#)

Fault Formation and Evolution in Rift Basins——Sandbox Modeling and Cognition [DOI](#)

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Abstract:

Abstract Fault distribution and evolution is the core on structure research, and also the key to oil and gas exploration in rift basin. Revealed by the large number of high-precision 3-D seismic data, the fault assemblage are very complicated in rift basins and it can not be provided a reasonable explanation with the existing structural geology - Anderson's model. the essence of the fault complexity and the intrinsic law evolution in rift basins have not been revealed with the existing models (multi-phase superposition extension model etc. The objective sandbox modelling are completed in the paper, with two typical Zhangjuhe structural belt in Bohai Bay Basin and Weixinan Sag of Beibuwan Basin - as the prototype covering high-precision 3-D seismic data, complicated fault distribution and assemblage, richness the basic structural characteristics of the target area are well reproduced. The basic characteristics of rift basin revealed by sandbox modeling are: 1) The faults controlled by basement pre-existing fabric constitute the framework of basin fault system; 2) the fault formation and evolution are controlled by basement pre-existing regional extension direction and extension amount. The firstly formed faults are those controlled by strong basement pre-existing fault. Then the faults controlled by weak-zone basement pre-existing fault formed. Finally, faults controlled by small basement pre-existing fabric formed. Finally, faults perpendicular to regional extension direction to form in the area far away from the basement pre-existing fabric. 3) At early stage of extension, fault formation is controlled by the trend of basement pre-existing fabric. With the increasing of extension amount, the direction become stronger, and the faults formed in late extension stage can usually reflect regional extension direction. 4) Uncoordinated progressive extension process is the root cause to lead to complex fault system. The mentioned fault formation and evolution law under uncoordinated extension in rift basin revealed by sandbox modelling can be scientifically and rationally explained with "non-coordination criteria", so the law is universal in rift basins.

Keywords: [Uncoordinated extension](#) [rift basin](#) [sandbox modelling](#) [pre-existing fault](#) [formation and evolution](#) ["non-coordination Criteria"](#)