

Structural Characteristics and Mechanism of the Horsetail Structure in China Offshore Basins: Case Studies from Liaodong Bay Area, Bohai Bay Basin and Weixinan Area, Beibuwan Basin

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OUTLINE



INTRODUCTION



RESEARCH



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INTRODUCTION

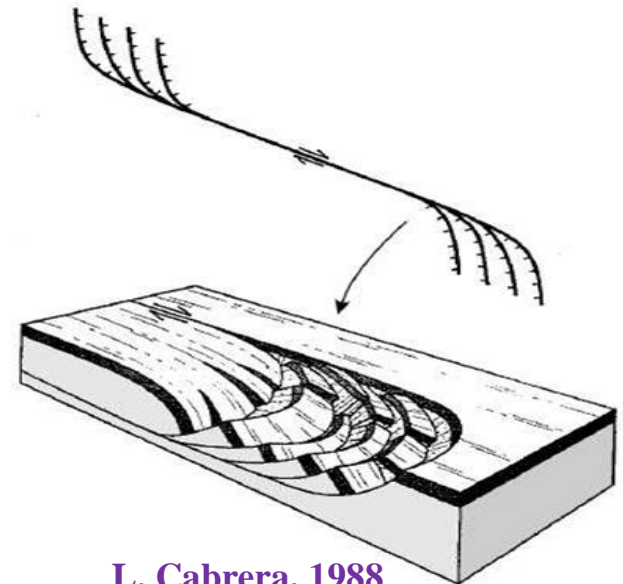
What is the horsetail structure?

➤ Broad sense

- Also named brush structure, generally refers to a sets of secondary faults converged to the primary fault on the plane

➤ Narrow sense

- Mainly refer to a structure developed at the end of strike-slip fault, which is mainly composed of main strike-slip fault and a series of secondary faults converged to the main faults
- It can be divided into compression and extension



L. Cabrera, 1988

extensional imbricate fans (horsetail splay)

INTRODUCTION

Where is the horsetail structure in China Offshore Basins?

- **A large number of horsetail structures are developed in China offshore, of which the Tanlu fault in the Liaodong Bay area of the Bohai Bay Basin and the Weixinan fault in the northern depression of the Beibuwan Basin in the north margin of South China Sea are most obvious**
- **With the deepening of petroleum exploration, more and more seismic and drilling data show that the development characteristics and genesis mechanism of the horsetail structure in these two areas are obviously different**

RESEARCH

- **Structural description of the horsetail structure in the Liaodong Bay area**
 - **The primary fault of the horsetail structure is the NNE-striking branch fault of Tan-Lu strike-slip fault zone. The NE-striking secondary faults converged to the primary strike-slip fault, and the section shows extensional faults**
 - **Fault activity analysis shows that both the primary and secondary faults intensively activated during the third Member of the Shahejie Formation (42~38 Ma)**

RESEARCH

- **Structural description of the horsetail structure in the Weixinan area**
 - **The NE-striking Weixinan fault is the primary fault of the horsetail structure, which is an extensional fault. A large amount of EW-striking secondary extensional faults converged to the primary NE-striking Weixinan fault**
 - **Fault activity analysis shows that NE-striking primary fault intensively activated during the second Member of the Liushagang Formation (48.6~40.4 Ma), whereas the EW-striking secondary faults intensively activated during the Weizhou Formation (33.9~23 Ma)**

DISCUSSION

■ Mechanism analysis of the horsetail structure in the Liaodong Bay area

The different structure and evolution of the horsetail structure in the Liaodong Bay area and Weixinan area are mainly resulted from the regional tectonic settings

- About 42 Ma, the change of subduction direction of the Pacific plate and the India-Eurasian collision resulted in the right-lateral strike-slip movement of NNE-striking Tan-Lu fault and the formation of NE-striking extensional faults along the bend of the strike-slip fault, therefore, the horsetail structure of Liaodong Bay area formed

DISCUSSION

■ Mechanism analysis of the horsetail structure in the Weixinan area

The formation of the horsetail structure of Weixinan area is related to the clockwise rotation of extension stress in the South China Sea (SCS) :

- During Paleocene to M. Eocene (65~37.8 Ma), the retreat of Pacific plate subduction zone resulted in the formation of NW-SE extensional stress field in the north margin of the SCS, NE-striking primary fault of horsetail structure formed
- During L. Eocene to E. Oligocene (37.8~28.4 Ma), the change of subduction direction of the Pacific plate and the India-Eurasian collision resulted in the clockwise rotation of extension direction from NW-SE to N-S in the north margin of the SCS, a large amount of EW-striking secondary faults of horsetail structure formed, and the horsetail structure was totally formed in the Weixinan area until this stage

THANK YOU!

