

# **Seismic Sequence and Seismic Facies Analysis of the Depositional System Offshore Central Taiwan**

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## **Abstract**

This study aims to establish the stratigraphic framework of the offshore central Taiwan foreland basin, reconstruct its sedimentary infill history, and explore how orogenic development influenced the sedimentary environment of the foreland basin. To achieve this, seismic sequence and seismic facies analyses were conducted and integrated with well data for interpretation. The research results show that three sequence boundaries, from oldest to youngest being SB-A to SB-C, and four major seismic sequences, from oldest to youngest being SQ1 to SQ4, can be identified in the study area. SB-A and SB-B are primarily characterized by onlap contacts, suggesting two phases of rapid accommodation increase, interpreted respectively as recording the initiation and subsequent deepening of the foreland basin during orogenic loading. SB-C is a downlap contact, indicating that the depositional system began to prograde horizontally toward the basin. SQ1 is characterized by parallel reflections, low amplitude, and moderate continuity; The bottom of SQ2 onlaps onto SB-A and exhibits a wedge-shaped external geometry with parallel to sub-parallel reflection features, with the lithology primarily consisting of shale; The bottom of SQ3 onlaps onto SB-B and exhibits a wedge-shaped external geometry, with internal seismic facies characterized by parallel reflections occasionally interbedded with chaotic and erosional reflections; According to well data, its lithology is coarser than that of the previous stage. SQ2 and SQ3 likely represent the establishment and deepening stages of the foreland basin, where the basin underwent rapid flexural subsidence controlled by orogenic loading, forming an underfilled depositional environment; SQ4 exhibits internal features of shingled and localized chaotic geometries along with north-south oriented channel erosional reflection characteristics. Based on well data, its lithology is coarser than that of SQ3. This represents that as the development of the orogeny weakened and the sediment supply exceeded the rate of flexural subsidence, the basin was gradually filled with sediment, evolving into an overfilled stage. Isopach map distributions show that the depocenters of SQ2 to SQ4 gradually migrate southward, suggesting that this phenomenon may reflect the southward progression of the Taiwan collision orogeny

and the corresponding southward migration of the foreland basin's flexural subsidence center. Overall, the stratigraphic framework reconstructed in this study shows that the foreland basin offshore central Taiwan experienced a filling transition from underfilled to overfilled, and the southward migration of depocenters may reflect the southward migration of the flexural subsidence center related to the collision, thereby providing a regional stratigraphic framework for understanding foreland basin development offshore central Taiwan.

**Keywords:** Offshore central Taiwan, Multichannel seismic reflection, Depositional Environment, Seismic facies analysis, Seismic stratigraphy