

Structural features off southwestern Taiwan

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Abstract

Seismic reflection profiles reveal a complex system of faults, mud diapirs, submarine channels, and sedimentary basins in the offshore area southwest of Taiwan. Structural patterns demonstrate the on-going structural transformation from the passive Chinese continental margin to the Taiwan collision orogen. The boundary between the Chinese continental margin and the Taiwan orogen can be clearly delineated by the deformation front of the contractional structures. West of the deformation front, ENE–WSW trending normal faults prevail in the continental margin, which is characterized by a horst-and-graben structural style. East of the deformation front, west-vergent imbricated folds and thrust sheets abound in the accretionary wedge. The structural grain of the accretionary wedge trends NNW–SSE in the deep offshore area but bends toward NNE–SSW in the shallow near shore area. Mud diapirs emerge through thick sedimentary layers forming NNE–SSW trending anticlines that extend from near shore areas to onland Taiwan. Mud volcanoes have been observed on 3.5 kHz profiles over several diapirs. Structural styles observed across the frontal portion of the submarine Taiwan accretionary wedge are strongly controlled by the tectonic evolution of the arc-continent collision. The structure and location of the deformation front are affected both by the growth of the accretionary wedge and by the geometry of the Chinese continental margin basement.

Keywords: seismic imaging; arc–continent collision; Taiwan; continental margin; accretionary wedge; deformation front

1. Introduction

The island of Taiwan is located at the juncture of the Ryukyu and Luzon island arcs along the western margin of the Philippine Sea. South of Taiwan, the South China Sea lithosphere is subducting eastward under the Luzon arc. East of Taiwan, the Philippine Sea plate is subducting northward under the Ryukyu arc (Fig. 1). The

Taiwan mountain belt is formed by the late Cenozoic collision of the Luzon arc with the Asian continent (Biq, 1972; Chai, 1972; Bowin et al., 1978; Ho, 1986; Teng, 1990). The structural grain of the Taiwan mountain belt trends NNE–SSW, forming an arc convex toward the Asian continent (Fig. 1). Onland Taiwan, the orogenic structural features are well demonstrated by a series of stacked folds and thrust sheets verging west (Ho, 1982). These orogenic structural features are believed to extend southward to offshore southwestern Taiwan (e.g. Letouzey and Sage, 1988). However, as they are buried by the thick

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