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Construction of Structural Transferring in Salient of Fold-thrust Belt, NW Taiwan

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The salient in a fold-thrust belt corresponds to a pre-orogenic basin with thicker sedimentary deposits relative to the adjacent areas. Owing to pre-existing tectonic weakness and variation in stratal thickness in the deformed sedimentary basin, the major thrusts and their related fold structures display discontinuous segments and are connected by transfer structures, which are characterized by lateral variation in magnitude of displacement, slip direction and style of fault-related structure. Commonly any 2D structural profiles are constructed avoiding such structural transfer zones. On the other hand, comparison among a series of structural profiles always demonstrates anomalous changes of fault and fold shapes in two adjacent profiles though such changes are not indicated by surface geological settings. Analysis and construction of 3D geometry of a fold-thrust system by combining a series of 2D structural profiles can give a good opportunity to test and revised the constructed profiles and to delineate the characteristics of structural transferring along the fold-thrust belt.

Foothills belt in NW Taiwan is characterized by the salient in the fold-thrust belt, which faces a pre-orogenic extensional basin. In this study, we compiled several constructed structural profiles across the belt to analyze the characteristics of variation in thrust fault shape, especially the dipping angle and depth of bedding slip surface, in the subsurface. We have revised, with supplement of seismic data, some of the profiles by topological constraints from the detailed surface geology and come to a reasonable construction of 3D geometry of the fold-thrust system. The structural transferring in the northern part of the salient is characterized by 1) major thrusts converging toward to the transfer zone in the inner part of the fold -thrust belt, and 2) appearance of W-E reactivated normal fault with high-angle dip to the south. Also in the inner part of the belt the high-angle major thrusts transfer into the low-angle ones to the south. In the main part of the salient the subsurface fault and fold structures intertwined with each other but can be clearly traced and show a specific style of transfer structure in the segment. Some major thrusts diminish to the south and are diverted and split into synclines and anticlines to the south. In the outer part of the fold-thrust belt the major thrusts are segmented by a series of W-E reactivated normal fault. Transfer zone between narrow-spaced and high-angle thrust related structures (fault-propagation folds) and wide-spaced and low-angle thrust related structures (fault-bend folds) appears in the southern part of the salient. Yet the correlation of thrusts on both sides of the transfer zone based on slip-surface still could enable us to identify the northern extension part of the low-angle thrust.

In summary, we propose several common characters for structural transferring within the salient, which is manifested not only by lateral ramp of thrust but also by different style of fault-related fold.